FEBRUARY, 1939

Railway Engineering and Maintenance

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AS TIME marches on improved types of HY-CROME Spring Washers have been developed and carefully tested to anticipate railroad needs. The DOUBLE HY-CROME Spring Washer, a new addition to the HY-CROME family, has new and valuable characteristics which cannot be equalled by the helical straight coil Spring Washer ordinarily used in track joint construction. To meet the demands heavier traffic loads and higher train speeds have created, additional reactive pressure and range was necessary. This new DOUBLE HY-CROME Spring Washer will quickly demonstrate its value, and we recommend a trial test for your consideration. Foresight and research again enables us to offer another improvement in product. Reliance sales engineers will be pleased to call without obligation and test samples and data are available upon request.

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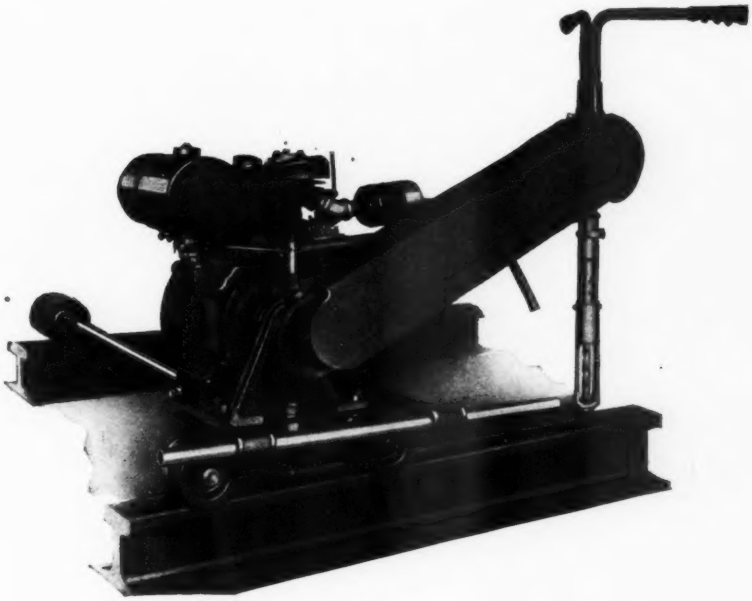
Raco Tie Boring Machine



Bores ties more than twice as fast as any other accepted means . . . Bores holes absolutely vertical . . . Locates all holes exactly in center of tie plate punching . . . Automatically controls depth of hole . . . Chips are blown away from hole as fast as made, leaving hole clear . . . One-man operation . . . Operator works in an erect position . . . The machine pushes or pulls along track with a pressure of five pounds . . . It can be removed from track by one man.

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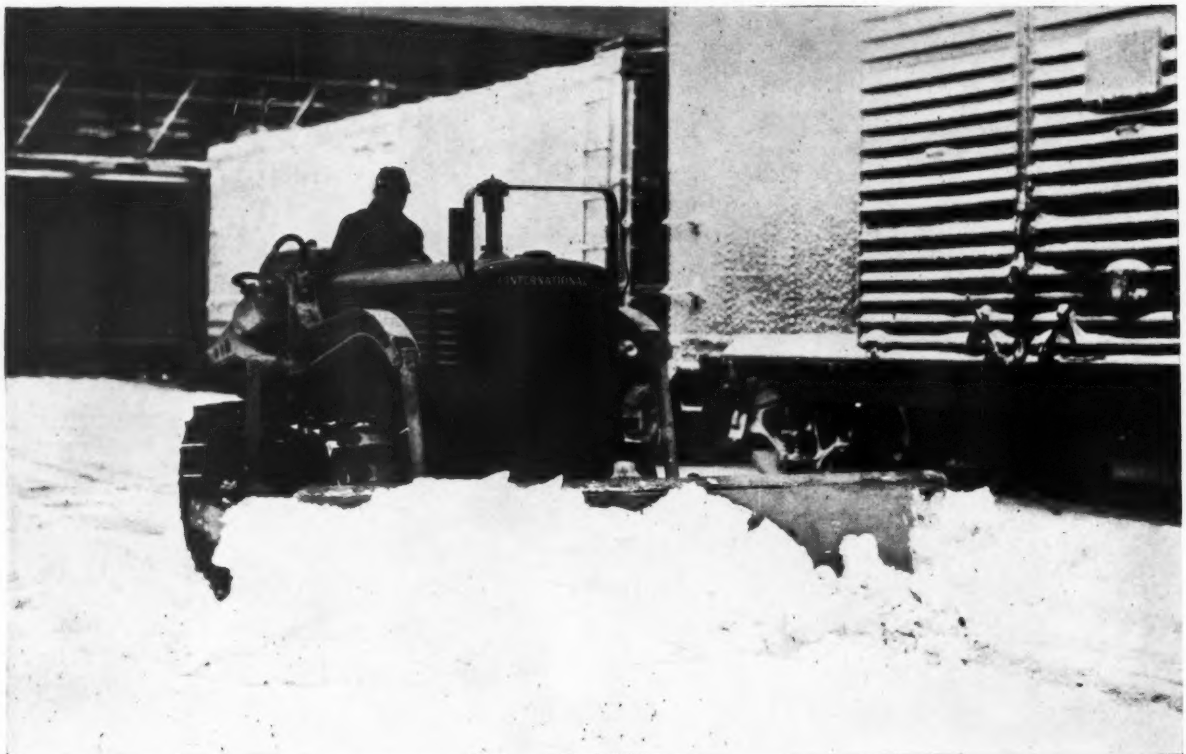

Snow-removal is one of the big winter jobs done efficiently by International TracTracTors, equipped with bulldozer as shown here or with snow plows especially designed for this work.

No. 122 of a series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: Twenty-Eight Years

February 1, 1939.

Dear Reader:

As I am today beginning my twenty-ninth year of continuous association with you in the relationship of editor and reader, it is perhaps only natural that I should look back over the twenty-eight years that have intervened since I gave up my position as a division engineer on the Chicago, Burlington & Quincy to undertake the organization of a new service for you and reminisce a little over the changes that have taken place in this period.

In my days of direct railway service, we took pride in our accomplishments. The railways were building 3,000 miles of new lines a year. Yet, 90-lb. rail was the heaviest in common use and many important lines were laid with 75-lb. and 85-lb. sections. This rail was placed laboriously by tong men. Transverse fissures were then unknown. Treated ties were new to most roads; tie plates were little used. And such adzing as was done was done by hand. The hand car was the universal means provided for the transportation of maintenance of way forces to and from work. Such were the standards of that day.

The years that have intervened have been years of marvelous development in all branches of railway activities, and especially so in maintenance of way. New and more severe demands of traffic have brought stronger tracks and structures, and more exacting standards of maintenance; while the increasing necessity for lower and still lower costs has created the incentive for a development in machinery and equipment for performing maintenance work that is little short of spectacular--a development representing an investment by the railways in excess of $100,000,000 that has not only effected large economies for the railways but that has also lifted a large part of the drudgery from the backs of maintenance men and greatly increased the safety of their operations.

Throughout all these years, the rate of improvement and of progress has been constantly quickening. The last few years have been the most rapid of all--with their necessity for adaptation to train schedules unthought of a half decade ago. And the end does not yet appear to be in sight.

It is this spirit--a spirit that has refused to accept defeat in the face of the most drastic decline in earnings in the history of the railways--that has given the American railways the largest fleet of trains in the world operating at overall speeds from terminal to terminal of 60 miles and more per hour--and has provided tracks and structures over which these trains are operating with records of safety far surpassing any heretofore reached.

This has been the record that you have made and that we have recorded during these twenty-eight years. The associations of these years have been happy associations for me; I hope that they have been equally pleasing and constructive for you. Many of you have been members of our circle of readers through all these years.

The past years have been eventful years. Those that are ahead hold even greater promise. As we move forward, I hope that we may continue to enjoy them together.

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor.

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Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

FEBRUARY, 1939

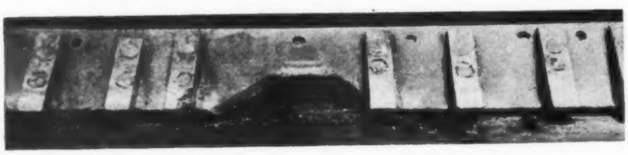
RECONDITIONING M W EQUIPMENT

offers a fertile field for economy

Welding and Hard Facing restored this Spreader to good-as-new service-ability with big savings.

Box Plate of the Spreader after arc welding with AIRCO Rod and facing with STOODY Hard-Facing Rod.

Shoulder Leveler hard faced and mounted with arc welded bolt pin. Entire bottom surface is also hard faced. Below: Ice Breaker with teeth gas welded on and hard faced.



An increasing number of railroads are finding it profitable to recondition worn and broken MW equipment. By the application of WELDING and HARD FACING a wide variety of such equipment is being *restored to a condition fully as good as new, at a relatively small cost.* A typical example is the Spreader job illustrated.

By these same methods, such other equipment as ballast moles, tie tampers, ditchers, motor cars, etc., can be saved for years of additional service.

To Railroad Maintenance of Way Officials who want to determine exactly where and how it would pay to recondition equipment with welding and hard facing, AIRCO's Railroad Engineering Department offers the benefit of its wide practical experience in this work. A fully qualified Field Service Engineer from this Department will call on request.

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Railway Engineering and Maintenance

Highway Costs

Brought Out in the Open

THE fact that the railways are in dire straits is known to every railway employee. The further fact that they are in this condition in no small degree because of the loss of traffic to competitors on the highways is equally well known to these employees. They have contended further that this competition exists, in large measure, only by reason of the subsidy given them by the public in the provision of right-of-way and roadway, comparable with the tracks and structures of the railways, at a cost far less than that necessary to make good the wear and tear resulting from this use, to say nothing of the amortization of the investment.

Truckers "Taxes"

Highway trucking advocates have long made much of the "taxes" of various kinds that they pay, creating the inference that, like taxes from other sources, they are contributing to the support of government. Railway employees have long pointed out, however, that these so-called taxes are, in the main, nothing more than rental, although entirely inadequate, for the use of public property. They point out that the railways spend more than 10 cents of each dollar they earn for the upkeep of their roadway and structures. They point out further that the railways are obligated to pay approximately 13.4 cents more as carrying charges on their investment in their rights-of-way and roadway. And in addition, they spend approximately 8 cents for the support of government. In other words, the railways spend 31.7 cents of each dollar earned for carrying charges on and upkeep of their roadways *and for taxes,* as compared with total payments, including gasoline taxes and license fees, of only 4.5 cents per dollar of revenue paid to the government by highway truckers.

The inadequacy of the payments made by the truck operators for the use of the highways is thus self-evident. It has come to be recognized of late especially by state highway authorities who are confronted with the necessity for the reconstruction of many of their highways long before their anticipated life has been reached. The difficulty has been to determine the extent of the destruction of the highways by the traffic of commercial truckers.

Among the states in which the cost of highway maintenance has become acute is Illinois. Prompted by the rapidly rising costs of highway maintenance, the highway authorities of this state undertook studies to determine the relation between the volume and nature of the traffic carried on the highways and the cost of maintaining these highways. In these studies they have compared maintenance costs on highways of comparable construction but carrying widely varying volumes of truck traffic. The results of these studies were made public in recent weeks in an answer to a suit filed by certain truck operators who were seeking to restrain that state from enforcing certain provisions of its motor carrier law. In his decision, the judge of the United States District Court sustained the contention of the state and incorporated much of its data in his decision.

In its presentation the state showed that it had a total public investment in its highways, exclusive of the value of right-of-way, in excess of $1,587,864,749 and, including right-of-way, in excess of $2,739,917,547. It showed also that its annual cost of providing highway facilities in Illinois, chargeable to motor vehicles as a class, is in excess of $116,220,000, while its annual income from registration and license fees and from motor fuel taxes totaled only $52,361,908, or less than half the annual expenditure, leaving the remainder to be borne by general taxation. Furthermore, $36,406,671, or about 70 per cent of the total amount collected, came from passenger cars, leaving less than $16,000,000 coming from trucks.

Costs Versus "Taxes"

Through the studies which it made of the cost of maintaining highways carrying various classes of traffic, the highway department was enabled to determine the annual cost of highway use of each type of vehicle. This was shown for trucks of various weights, together with the revenue now received by the state per vehicle to be as shown in the accompanying table.

These figures, which were accepted by the court and included in its decision, confirm the contention of the railways that trucks of 3,000 lb. weight and heavier are paying only about a third of their proportionate out-of-pocket cost of maintenance of the highways used by them, thereby not only completely refuting the contentions of the truck operators and their proponents regarding their

"taxes" but laying the basis for increases in license fees ranging up to $1,000 per truck per year for the heavier vehicles. That such increases will contribute directly to the reduction in the burden of highway maintenance now

Trucks—Class	*Allocated Cost Per Truck*	*Revenue Per Vehicle*	*Deficiency*
3,000 lb. and under	$ 53.61	$ 31.11	$ 22.50
3,000 to 8,000 lb.	115.64	46.68	68.96
8,000 to 9,000 lb.	212.79	76.64	136.15
10,000 to 12,000 lb.	297.52	103.19	194.33
12,000 to 14,000 lb.	370.36	127.76	242.60
14,000 to 16,000 lb.	487.13	167.47	319.66
16,000 to 20,000 lb.	639.23	213.59	425.64
20,000 to 24,000 lb.	839.95	268.54	571.41
Over 24,000 lb.	1,361.28	364.56	996.72

borne by the public is evident. That such increases will tend also to curb the operation of trucks in competition with the railways is equally evident.

The initiative taken by the highway department of Illinois in developing these facts is to be highly commended, for it is a distinct step towards placing each agency of transportation on its proper basis. When the time is reached that all of these agencies are placed on a comparable and equitable basis, and only then, will it be possible to determine the extent to which each is best able to serve the public. It is for such a basis that railway employees contend. For this reason, they can do much to stimulate similar studies in other states by giving wide publicity to the facts developed in Illinois.

Convention Week

An Opportunity for Railway Men

THE snow still flies in many parts of the country, but one of the most potent reminders that the heavy work season for maintenance of way forces is only a few weeks away, is the activity of the American Railway Engineering Association in perfecting plans for its annual convention in Chicago on March 14-16, and of the National Railway Appliances Association in making final arrangements for its annual exhibit at the International Amphitheatre. For 39 years the A.R.E.A. has met annually and for 27 years the N.R.A.A. has been presenting an exhibit of railway materials and equipment in conjunction therewith.

This long and enviable record of achievement of both associations has meant much to the American railways, individually and collectively. It has been brought about by far-seeing, energetic engineering and maintenance officers, who have appreciated the value of collective study and the free exchange of ideas, and by equally far-seeing manufacturers of railway materials and appliances, who have made railway problems their problems and, working with railway officers, have contributed invaluable aid in their effective and economical solution.

Now another convention and another exhibit are near at hand, with every indication that the keen interest of former years will again prevail. In fact, it is expected that interest and attendance will exceed those of most of the depression years by reason of the outlook for a materially better railroad year ahead. To railway men the manufacturers' exhibit offers an opportunity to see first hand the latest improvements in materials and equipment. It also offers an opportunity to railway supply companies to contact railway men and to present their products to them under highly favorable conditions.

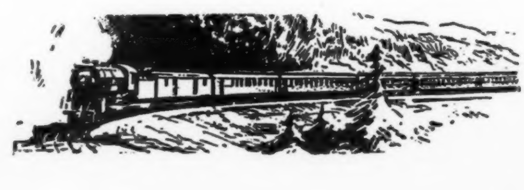
Subdrainage

Careful Investigation Is Essential

AT this season, when so many maintenance of way men are planning their operations for the coming spring and summer, it would appear unnecessary, yet timely, to call attention to the importance of giving consideration to roadbed subdrainage where the indications are that such is necessary to improve riding conditions and secure economical track maintenance. This reminder appears unnecessary in most instances because so many maintenance of way men are fully conscious of the advantages of an adequately drained roadbed and have been giving it more attention in recent years than ever before.

There are still some maintenance men, however, who, because of limited funds or for other reasons, have neglected drainage problems year after year, and others who have attacked them only in a haphazard manner. Both of these practices, assuming that reasonably high standards of maintenance are necessary, are eating into maintenance costs year after year, with little or no hope of permanent benefit. In other words, ballast on top of ballast and repeated surfacing over undrained wet spots are reoccurring expenses which soon exceed by many times the cost of an adequate and permanent subdrainage system, while a haphazard or makeshift attempt at drainage, without a careful and intelligent diagnosis of conditions, can be and frequently is a waste of money.

Good judgment is essential to the solution of any maintenance problem, including drainage, but most effective subdrainage, dealing as it does with so many hidden and variable factors, cannot be secured from judgment alone. If a problem consisted only of free ground water and its interception or removal from a known uniform depth, the problem would not be so difficult, but every student of drainage knows that under most circumstances various physical characteristics of the soil involved, including texture, moisture-retaining capacity, porosity and capillarity, are among several factors which must be taken into consideration. In effect, the proper solutions for the wide range of drainage problems are almost as varied as the problems themselves. What may be an ideal solution for one condition may be entirely wrong or wasteful for another. Such being the situation, a field investigation, as thorough as necessary to establish the facts, should form a part of each subdrainage project. Many roads already follow such



a practice and when they spend money for subdrainage installations, they then find that they are spending it effectively and that it is returned to them many fold in lower track mainenance costs.

With so much roadbed stabilization work through subdrainage required by the railways, especially in view of the greater refinements in the track structure that are being demanded by the increased operating speeds of the day, and the still pressing need for further economy in track maintenance, it is important that this be the case—that for every dollar spent for subdrainage, there be a maximum return in effectiveness. This can only be done by developing the full facts concerning each problem before attempting its solution.

Steel Piles

Valuable for Anchoring Substructures

THE use of steel sections for bearing piles, contrary to the belief of many, is not a development of recent years, although it is true that considerable impetus has been given this practice during the last few years through the introduction of H-type sections of the larger sizes. Steel sections for piling have been used for more than 40 years in certain parts of the country, largely in connection with highway bridges, and, where used properly, have given a good account of themselves, both structurally and as regards resistance to corrosion. Their more general use, however, especially in sizable structures, has occurred only during the last ten or more years, during which time they have been employed in increasing numbers in prominent highway structures and in at least a few sizable railway structures.

While this type of piling appears to have few limitations, most of the railway installations to date have been for pier or abutment footings in river or stream beds, in an effort to secure sufficient penetration, either to insure adequate bearing capacity or to protect against scour. As a matter of fact, the severe floods of recent years in various parts of the country, with the widespread damage which they have caused to bridge structures, largely through undermining them, have greatly increased the interest of railway engineers in the use of H-type piling, and several roads are now employing it for the first time in rebuilding structures over waterways subject to severe wash. In these structures, the piling has been driven to depths in excess of 75 ft. below the river bed as the foundation for concrete piers and abutments, either through soft material to a solid footing, or through sand, gravel and shale to depths far beyond any possibility of dangerous exposure by scour.

In the H-type pile they are finding a secure means of anchorage for substructures in unstable material of great depth and in hard-driving materials, which, while possessing adequate load-supporting power in themselves when undisturbed, are subject to erosion and wash under extreme runoff conditions. In these respects, they have found a valuable ally in the steel pile in their constant struggle against the forces of fast water and shifting river beds. With sufficient column strength to carry their load, even when unsupported laterally for considerable depths, the security they afford appears to be foolproof, the only question remaining in the minds of some being their ultimate service life under the moisture conditions to which they may be subject. Even this, however, is causing lessened concern as copper-bearing steel is finding its place in the piling, and as many installations of 30 or 40 years' standing indicates a service life of 100 years or more—in all probability, far in excess of that of the superstructures involved.

Slow Orders

Will Track Work Be Done Without Them?

FORMERLY, when rail was being laid by hand with relatively small gangs, it was customary to place a slow order over the section of track affected by the day's work. In general, it was required that closure be made for all scheduled trains so that they could proceed with no delay other than that imposed by the slow order, while other trains, presumably of lesser importance, were stopped and allowed to proceed as soon as the track could be made passable.

Maintenance practices change, however, as improvements are made in the means for doing work. For this reason, as power machines became available for the many operations incident to laying rail, considerations of economy led to the organization of large specialized gangs equipped with machines, some of which cannot be removed readily from the track. With these larger gangs the loss of time resulting from the passage of trains assumed considerable magnitude, to avoid which it became an accepted practice to divert traffic on multiple-track lines for the purpose of allowing the rail to be laid without interruption.

Indicating the rapidity with which maintenance practices also change as new conditions arise, the diversion of traffic around rail gangs had scarcely become a settled practice before the introduction of high-speed passenger trains and the shortening of all schedules produced a new situation with respect to the laying of rail and to the subsequent surfacing of it. High-speed schedules can be maintained only where the interruptions to sustained speed are kept to the minimum. Obviously, the diversion of trains around the work of these larger gangs involves some delay which can be made up later only by operating at speeds well above the average, and even this may involve considerable time and distance especially with the higher speed trains of today.

For this reason, some roads are discontinuing the diversion of traffic and are reverting to the former practice of laying rail under traffic, with the difference that slow orders are prohibited and it is required that the track must be in condition for full speed whenever a train is due. In other words, the maintenance of schedules is considered to be of such paramount importance that the loss of time occasioned by clearing the line of power machines and keeping the track in condition for full speed is negligible in comparison. As high-speed schedules are extended, it may be expected that this newer practice will become more widespread, or that other methods will be devised to avoid delays.

The "Coronation Scot," One of the High Speed Trains of the L.M. & S.

An English Officer Compares Maintenance Practices

Taking advantage of the fact that W. K. Wallace, chief engineer of England's largest railway, the London, Midland & Scottish, was in the United States for a few days on one of his periodic visits to this country, the Roadmasters and Maintenance of Way Association tendered Mr. Wallace a luncheon, during its convention, on September 21, following which he discussed American maintenance practices and compared them with those followed in England. This talk, which was one of the high lights of the convention, is abstracted here.

CONDITIONS on the two sides of the ocean are very different but I find that I can learn a lot by visiting here,—not things that I can copy, but things that I can adapt to our changed conditions. I think that to some extent the same would apply if you would come over to our side of the ocean.

We find that the demands on our track are increasing from year to year but that allowances for expenditures do not increase in direct ratio. The management always wants more for less. I expect that you find the same thing here because, while operating conditions may differ very widely on the two sides of the Atlantic, human nature is very much the same—and a general manager is the same anywhere.

We have found, with the high speed demands—and we have more than 6,300 train miles a day scheduled at overall speds of 60 miles an hour and upwards,—that maintenance practices that were quite good enough before are not good enough now, that we require further refinements, and that if these refinements are introduced into the track, they reduce future maintenance. I am sure that you all know that track that rides well at 60 miles an hour may ride very poorly at 80 miles an hour. And although we do not name as many trains officially as you do, we find in England that people who board a fast train which is advertised by name, name them unofficially if they are late. If the people get a little rough riding, they look out the window, think they are going to Heaven and complain—not about going to Heaven, but after we deliver them at their destination. If they travel at the same speed on the ordinary trains—and some of our ordinary trains run fast at times—they put up with rougher riding and say nothing about it. So, when we put on a high-speed train, we find that there is a definite demand for a higher standard of maintenance.

Section Gangs Do All Work

Maintenance on the British lines is entirely in the hands of section gangs. On lines with light traffic, the section gangs have motor cars. The busier lines do not have cars, largely because we cannot get possession of the track, for a motor car in England is treated with all the solemnity of a train. We do not run and trust to the Lord, the way you do here.

Our section gangs are the same size the year around, and they do everything to the track between times of relaying which, on our main lines, may be anywhere from 5 to 18 or 20 years. Track where the rail life is 4 years and under is re-railed intermediately but, generally speaking, when we relay rail, we also take out the ties. In other words, we renew it completely at one time.

Our section gangs, in some ways, have more duties than yours although one of your supervisors told me that your gangs do everything that is done on the road. Our section gangs maintain all the roadways, they weed and clean the ballast —in theory they are supposed to clean 80 yards per month—they maintain drainage, and they also maintain the fences. That in itself is a big job with us. Some of your railways do not seem to have fences, and even where they do have them they do not seem to give them the maintenance we do. We have still quite a large mileage of hedges. If we cut out a hedge and replace it with post and wire fence, we may find that the nearest director of the road gets a letter of protest from the land owners that we are spoiling the beauties of the countryside, and we are forced to initiate a lengthy correspondence which we keep up until we have the hedge all down.

Also, we must protect against fires all along our line. The law in our country is that when a fire starts along the railway and spreads onto the adjoining land, if the adjoining land has a growing crop, and that pretty well covers most places, we are liable and have to pay compensation for the crop destroyed. Consequently, we dig a strip about 18 in. wide all the way along the fence. This is part of the job of the section gangs.

Then once a year these men remove, oil and turn what we call the splice bars. They either mow or burn the grass, depending upon the sort of summer God sends, that grows upon the slopes to prevent the seed from settling over the track.

The section forces do odd jobs at passenger and freight stations. They have to truck coal out to the isolated signal cabins. They also distribute materials over the track for the signal and telegraph forces.

Fogging

And then in winter they fog. Fogging is quite a task with us because we sometimes have long, continued fogs that may last for a week. When a fog comes on, such that the signal man ceases to see a certain object, he sends for the fog man. Each section man has a specific signal that he goes to, and he remains there with a hand lamp and torpedoes, putting torpedoes on the rail and showing a red light when the signal is red. When the signal clears, he removes his torpedo and shows a green light. It is a very heavy task if one has a long, continuous fog, to arrange all the necessary reliefs for these men. In fact, on one heavily used suburban line that runs along the north shore of the Thames from London to Southend, on which there are a large number of signals, the chief operating officers ask us to employ extra gangs during the winter in order that they may have men available to call upon for fogging.

Chemical Weed Killing

On lines where we have gravel ballast or where our forces are very much reduced, we run chemical weed killing trains over the line to help the men with their weeding. We have never tried burners, for we cannot count upon the dry weather you get here and the cost of operating them would be larger in proportion than it is here. However, we are trying a hand flame thrower that I believe has been developed from the flame thrower the Germans used against us during the War.

Use Bull Head Rails

Our track is very different from yours. We use a bull-head rail, a sort of dumbbell section. It is supported by being placed in a cast iron chair with a jaw outside and another jaw inside. Our main line track rails weigh 95 lb. to the yard. That applies to all British railways, for we all use the same sections of rail. Branch lines are laid with 85-lb. rails. In some cases where the rail wear is very heavy, we put in 100-lb. rail, that being secured by adding 5 lb. to the head of the rail, for otherwise the section remains the same. The rail is not nearly so stiff as the rails in use in this country.

The chair, which weighs 46 lb., is secured to the tie by three lag screws which are galvanized. Underneath the chair and between it and the tie is a felt pad that is used not as a silencer but to prevent wear of the tie by the chair base and lengthen the life of the tie. The rail is secured in the chair by a wooden wedge, or now very often a spring steel wedge, which we call a key.

Sixty-foot rails are standard; as

Curves on the Main Lines of the London, Midland & Scottish Are Maintained to a High Standard

a matter of fact, one of the constituent companies of the L.M.S. has used 60ft. rails since 1895. On the other hand, we have only 24 ties to the rail, or 2,112 per mile. The joint ties are 12 in. by 5 in., and the intermediate ties are 10 in. by 5 in.; all ties are 8 ft. 6 in. long. We have rock ballast on all main lines, crushed to pass through a two-inch ring, usually granite, or in some cases limestone; in Scotland we use some whinstone.

Our rails are made of a milder steel than yours, 0.50 to 0.55 carbon, and 0.9 to 1.1 manganese. We use a splice bar 9 in. long with two bolts, not because we think a 9-in. bar is long enough but because with a bullhead rail and chairs one must have a short fish bar to get the joint ties together. On curves of two deg. and sharper we use an 18-in. bar with four holes.

All our rails now are oven-cooled. This controls the rate of cooling but is not a full-fledged heat treatment. The rails are put through a sheltered structure on the hot bank, staying in for 8 to 12 hr. The L.M.S. is now trying 5,000 tons of rails with the Sandberg regulated sorbitic treatment. We have not used this process to any great extent as yet but the British Southern, which has an intense suburban traffic with multiple unit electric trains, uses 10,000 tons of sorbitic treated rails a year and considers it good economy.

Ties Are Treated

Our ties are either Baltic or Douglas fir. All are treated with the full-cell process, using creosote. We adze and bore them before they are put into the cylinder, and afterwards apply the chairs mechanically. The chairs are placed on the tie ends, tools come down each with three wrenches, engage with the lag screw heads and screw them down. They are then loaded into cars and go to the site of the relaying.

The L.M.S. owns and operates four treating plants for ties, three fairly large and one quite small. Of the three big plants, two treat a half million ties each a year and the other 300,000. The small plant is in northern Scotland and treats 50,000 home grown ties a year. We use Scottish fir there, which both maintains the inhabitants and maintains our line.

The only variation in the design of track that I have outlined is on the Great Western Railway, where the chairs are bolted with two ⅞-in. bolts through the tie. We have tried some of this construction, building some ourselves and securing some from the Great Western, to be sure there would be no doubt about the operation. It is showing up better than the screw-spike track in sharp curves where we have trouble with widening of gage.

This year my company is hoping to relay new rails and ties in 637 miles of track. In addition, we are going to re-rail about 18 miles, and re-tie about 36 miles of track. This is an unusually large program for us, due partly to the fact that the steel mills were unable to make deliveries on our program dates. We expect, however, to renew about 550 miles of track per annum, using about 85,000 to 90,000 tons of rail. This is all put in during nine months, for we are not allowed to work on the main lines in July, August and September.

Rebuild Track Out of Face

This rail is all laid by extra gangs, and mostly by hand. We use cranes to a small extent in lifting in frogs and switches, but we have nothing like the machines you have for relaying rail. On the other hand, you must remember that we place all new ties and that, except for the special timbers at switch leads, etc., all our ties have their fastenings on them before they come on the ground.

The London & Northeastern has a track layer, a big, over-hanging cantilever machine that can bring forward a 60-ft. panel of track complete and put it down after it has lifted out the old material and run it back. The trouble is that for the track layer to be of value from the point of view of cost, it must have possession of the track for half or three-quarters of an hour, and that schedule is so difficult to obtain on the L.M.S. that the machine cannot earn the interest on the investment. We sometimes use two ordinary steam cranes on double track, with which we lift a panel of old track out with one crane and put it on a car, while the other crane lifts a panel of new track and puts it in place. As fast as a car is filled with old material, another is emptied of new material and we carry on in this way. That again requires the possession of the two tracks and it can, therefore, be used only to a limited extent.

One of our bugbears is the short possessions of the track for relaying. We do quite a lot of relaying on the L.M.S. with 10 or 15-min. possessions. After a 30-man gang has opened the cribs, we break the track immediately after a train passes, lift out the rails and the 24 ties with their chairs complete, put in the 24 new ones, tip in the new rails, partially key them up and let a train pass in 10 to 12 min. Between times, when we are unable to get the track for 10 min., the men take the chairs off the old ties or tamp the new roadbed and box it up.

Surface Track by Shovel Packing

After we have our new track in, it is given a slight lift and left a bit high with shovel tamping. It is then maintained by the section gang, using what we call shovel packing, which is not really tamping but lifting the ties and scattering chippings from ¼ to ⅜ in. in diameter for 15 in. outside and 15 in. inside the rail. On the L.M.S. we are using measured shovel tamping and think that we get a better job than by merely doing it by judgment. If we get a really good section foreman, he will do as good work by his own judgment as one will with measured shovel packing, but such a man is rather rare and the average man does better with the measured packing than otherwise. The beds are not disturbed between relayings. We merely add these chippings to them, without disturbing the bed. We may have tie beds that have been left undisturbed for 20 years.

Some ties have a much shorter life than the remainder and they are renewed by the section gang with serviceable ties, but generally speaking, the bulk of the ties stay in until the next relaying. On about one-fifth of our road we require renewal of rails and ties at the same time. Almost one-third of our track is relaid because the rails require renewal while the ties are not quite gone, and the remaining half of our track is relaid for the opposite reason. If a rail comes out before its usefulness is gone, it is put into a branch line or yard. Ties are used in the same way.

One of the things that has impressed me very much in America is the long periods that your tracks hold good line and surface between general repairs. I have wanted to see whether that was due to your type of rails. So we have laid about 5½ miles of track with the British standard 110-lb. flat bottom rail, and we are getting special reports on this rail from the section foremen as they maintain it and an adjoining section of our standard track laid at the same time.

Another thing that has struck me is the American practice of allowing the rail to take its wave motion independent of the tie. We do not do that. Our road is keyed up tight so

that it acts in a way similar to GEO track. American track has much greater horizontal strength than British because our rail has a 2¾-in. head and 2¾-in. base and is put out of line laterally much easier than yours. We have noticed particularly the good line on your track. Even where the surface is not very good, the line is good. I think that is due to the stiffness of your rail, and the fact that you can also get an adequate splice bar in as well.

Track Lacks Lateral Stiffness

One of the reasons we have not gone into the welding of track is that, although we have no such range of temperature as you have, I am not sure that our track would not kink because of a lack of lateral stiffness. The expansion stress set up in your rail by changes in temperature would, I believe, kink ours. The Southern Railway in England is welding three 60-ft. rails together into a 180-ft. section. The London Passenger Transport Board is making 300-ft. lengths by flash-butt welding, although this is a subway with only 4-deg. temperature range between winter and summer, so expansion troubles are non-existent there. Both the London & Northeastern and the L.M.S. have some 120-ft. rail in track in lengths of three-quarters of a mile or so. Those, however, are rails rolled to that length, and we paid so much extra for them that we do not think they are worth going further with.

Another oddity of our railways is that we wear our rails out. We take ⅝-in. vertically off the head before they come out where we do not have side cutting or other abnormal conditions. And we allow the weight to come down from 95 to 79 lb. Everybody I have asked in America advises that wear is not your controlling factor but that it is batter at the joints and the condition of the joints that make you take rail out. I have asked the question several times, "Does stiffer rail reduce abrasive wear?" If you have a line which wears, say, a pound of rail per annum and if you take that rail out and put in a much stiffer rail, will it still be reduced a pound per yard per annum, or more or less? The answers I got are about 50 per cent either way.

We would like to get a rail that will wear longer. Some of our wear is due to the fact that we have a milder steel than yours.

Batter is not a problem with us in Great Britain, partly due to our much lighter equipment. Our maximum axle load is 22½ long tons. Our freight equipment, particularly, is much lighter than yours. I suppose our average car does not weigh more than 20 tons, and it has 36-in. wheels, which is another help. Our passenger cars have 43½-in. wheels and that also helps the roadway. Consequently, we do not weld any rail ends. When our joints begin to go down, we use shims. We also use four men. We have had this method on trial on the L.M.S. for three years and we have almost 2,700 sets of this equipment in use now, so that it is going to be the general practice with us in the very near future.

The British lines are old. They were built long before we knew anything about the present-day high speeds. Consequently, our track was all laid with circular curves direct

A Busy, High-Speed Interlocking on the L. M. & S.

reformed fish plates with a bit of a hump on the back of them. We get about 100,000 pairs of those bars annually from our mechanical shops at Crewe.

In America, I understand that it is your practice in maintaining your main track to give it about a one-inch lift and put in the necessary ballast, with an extra gang with tampers and that your track then stands for three to five years before you repeat the work. Between times the section gang maintains the track with picks, and if it gets too bad, you send a gang to help them, with or without mechanical tampers.

In Great Britain, all maintenance between relayings rests with the section gangs. They attend to the alinement and take out the low spots by means of what we call shovel packing. We do not give the track a general lift between relayings. Very often we could not give the road a lift if we desired because a very large part of it is under bridges where we have the minimum clearance.

On the L.M.S. we find that measured shovel packing lasts from 50 to 100 per cent longer than ordinary shovel packing done by judgment. Another advantage is that one can do it with a gang of only three to

from the tangents. In most cases we now have these curves spiraled and it is done usually by the Hallade method.

Elevation Through Turnouts

Another thing that we have is a large number of junctions. The network of railways in our country is very dense. Frequently both lines diverging from a junction have high traffic importance, so that we get a large number of speed restrictions, which are very objectionable when we begin to speed up our trains. To cut down the number of these speed restrictions, we go in for what we call two-level chairs; that is, progressively thickening the base of the chair between the heel of the switch and the beginning of special chairs on the frog, either by 1/12 or 1/16 in. By that means we go up gradually to 2 in. of elevation, and if we cant the timbers as well, we can get up to 4 in.

We have elevated about 80 junctions and 360 minor jobs that way on the L.M.S. The two-level chair is of considerable help. Generally speaking, we have found that by this means we have been able to ease the speed restrictions on the junctions

(Continued on page 86)

Removes Rail Corrugations With New Grinder Car

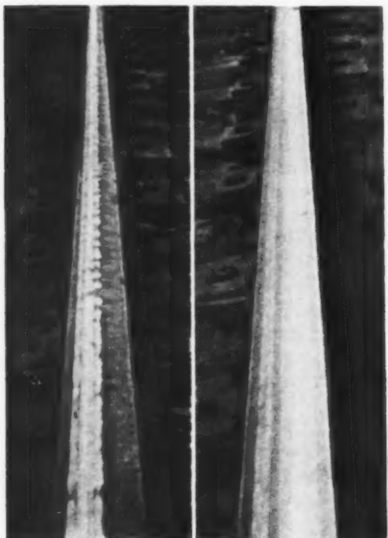
CORRUGATIONS and other minor defects in the running surfaces of rails are now being removed effectively and economically on the Pennsylvania by means of a new type grinder car which utilizes 12 steel-back cup wheels as the grinding agency, six of which are arranged in a straight line over each rail but which can be tipped to provide six separate grinding planes on the rail head surface if and when desired. A product of the railroad's own efforts, the car, after a short development period, was first placed in continuous service on June 17, 1937, and during its first period of operation, which extended up to February 6, 1938, effectively removed rail corrugations from an average of 5,400 ft. of track per day at a small cost per lineal foot of track. It is pointed out that this cost could be further reduced if a number of such grinding cars are operated together as a unit. The car was in almost continuous operation during the 1938 working season and, on the basis of the results so far obtained, the railroad feels that it is justified in the conclusion that the car constitutes an effective solution to the problem presented by the presence of rail corrugations.

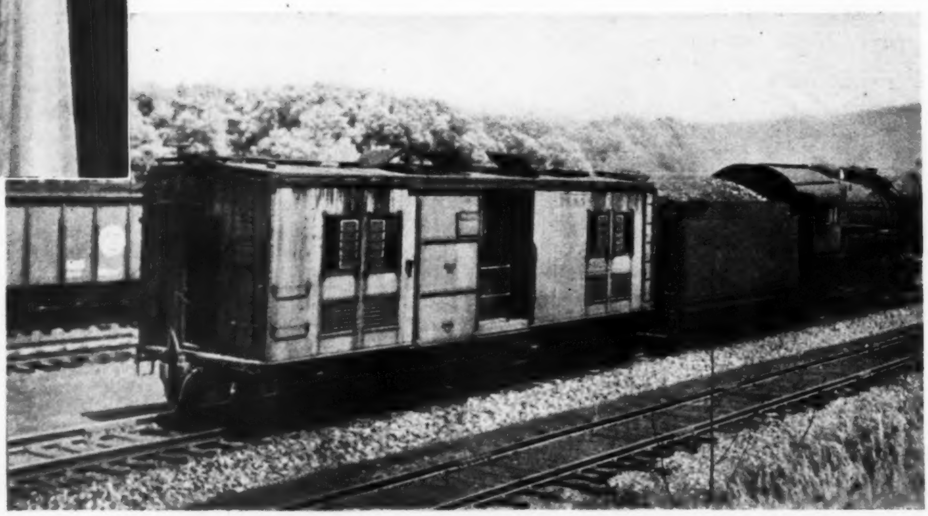
On the Pennsylvania, as on other heavy-traffic roads, the rail corrugation problem has attained considerable proportions in recent years. As a result of a recent survey it was disclosed that approximately 75 track miles of rail on this road were corrugated in some degree, the corrugations ranging in depth from 0.003 in. to 0.008 in. or more. Hence, because of the widespread prevalence of the corrugations and the troublesome character of the difficulties which they impose, the railroad was stimulated to an intensive study of the problem, which resulted in the development of the grinder car. This car represents the first large-scale attempt of the Pennsylvania to deal with the corrugation problem.

The 12 grinding wheels embodied in the new grinder car consist of 10-in. by 1¾-in. steel-back cup wheels with 4-in. cutting faces. Experience has shown that 30-grit abrasive wheels give the best results. Each wheel is mounted on the lower end of the rotor of a vertically-mounted electric motor, a small amount of end-play being permitted at the motor shaft to give grinding flexibility. The grinder motors are arranged in two groups of six each beneath the floor and between the trucks of an X 25 steel box car in such a manner that in each group three motors are in tandem formation over each rail. Each group of six motors is mounted on a specially-designed truck, 8 ft. 6 in. long between axles, which operates on the rails by means of four 16-in. motor-car wheels and which is connected to the center sill of the car by means of a universal knuckle-connected drawbar attachment, giving it freedom of movement.

Raise and Lower Trucks

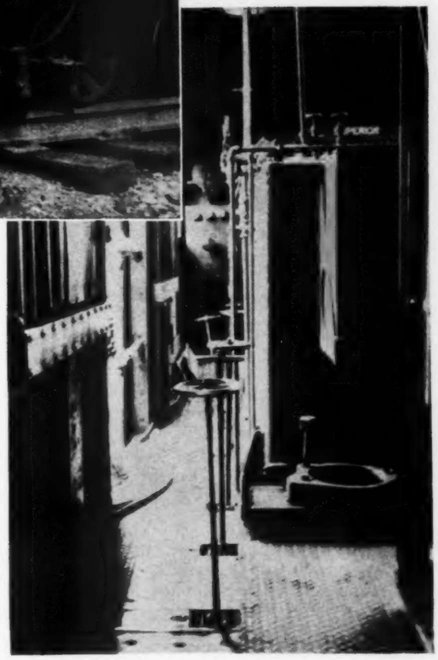
To permit the trucks to be raised off the rails when the grinding car is not in operation, a lifting arrangement is provided which utilizes compressed air from the train line. The lifting of each truck is accomplished by means of a standard passenger air brake cylinder, the shaft of which, through the necessary connections, actuates four toggle levers, one at





Above—A Corrugated Rail After One Pass of the Car, and After All Corrugations Were Removed. Right—Best Results Are Secured When Operating at A Speed of About Two Miles An Hour

Left—View of One of the Trucks Lowered On the Rails (Wheel Guards Removed). Below—Interior View Along One Side of the Car.



The Pennsylvania is now successfully effacing rail corrugations and other minor surface defects on a large-scale basis with a new type grinder car that embodies steel-backed cup wheels as the grinding agency. In this article are described the mechanical details of the new car, its method of operation and the results which are being obtained

each corner of the truck, which are attached to the underframe of the car. The necessary connections between the ends of the toggle levers and the truck frame are provided by heavy steel chains.

This arrangement makes it possible to raise the trucks to a point where the treads of the wheels clear the tops of the rail by 6½ in. Locking pins are provided for securing the grinder trucks in the raised position to the car underframe when moving to and from the site of the work or for long-distance hauling. By means of similar pins at the air cylinder connections, the trucks may be secured in the raised position when making short non-operating movements, as at sidings or crossovers.

As the grinder motors are mounted on relatively short wheel-base trucks, whose movements in a lateral direction, when in the lowered position, are substantially independent of those of the grinder car, the positioning of the grinding wheels with respect to the rails is affected only slightly on curves where the car as a whole assumes the position of a chord to the circle. However, because some difficulty might be experienced when lowering the trucks on curves, suitable guides are provided for directing the trucks to the proper position on the rails. These attachments are, of course, not needed when the car is on tangent track.

Motors are Tiltable

The grinder motors are 5-hp. units wound for operation with 220-volt, 3-phase 60-cycle current and operate at 3,600 r.p.m. Each of them is mounted in a frame or cradle which is attached to the truck by means of brackets. Each motor is mounted in its frame by means of two bearings that form an axis directly above and parallel with the rail, about which the motor may be tilted or rotated within limits in a plane perpendicular to the center line of the web of the rail to obtain the desired position of the face of the grinding wheel relative to the running surface of the rail. Because of the curvature of the rail head, the area of the running surface that is contacted by the flat surface of each grinding wheel consists of a strip ranging in width from ¼ in. to ⅝ in., depending on the section of the rail and also on the extent of the wear that has taken place. By varying the tilt of the motor, the same wheel may be made to grind a strip in any desired position across the rail head.

Moreover, as the tilt of each motor is varied from time to time during the grinding operation in order to change the position of the contact area on the rail head, the inclination of the grinding surface of the wheel changes accordingly so that the wheel remains roughly perpendicular to the radius of the top surface of the rail head. Because of this feature, the grinding operation preserves and restores the curved surface of the rail head.

The tilt of each motor is adjustable individually by means of a screw and nut arrangement, involving a universal joint, which is provided at the top of the motor frame. The extent of the tilt is indicated by a pointer attached to the motor frame, which moves on a segmental scale fixed to the supporting bracket. This scale is graduated in inches both ways from the center, and indicates the tilt of the motor up to 3 in. in either direction from the vertical.

To permit vertical adjustment of the motors relative to their frames,

each unit is mounted in its frame on two guides which allow a vertical movement of about 2⅜ in. This feature, in conjunction with the hydraulic balancing system described below, makes it possible for the

View of One of the Grinder Motors. The Segmental Scale for Indicating the Tilt of the Motor is Shown at the Left, While the Tilt Lever is Visible at the Right

wheels automatically to adjust themselves for wear, and contributes to grinding flexibility in general. By means of a handwheel on the end of a shaft that extends through the floor of the car, each grinding motor may be raised and lowered individually on its guides from the interior of the car. With this feature, individual motors may be taken out of service for repair or because of overheating.

Hydraulic Balance System

When the grinder car is in operation, the force with which the individual wheels bear on the surface of the rail is controlled by two hydraulically-operated balance pistons or plungers at each motor. Without these pistons each wheel would have the full weight of the motor behind it but, since this would result in the motor becoming stalled or in other difficulties, the balance pistons are provided as a means of counter-acting the weight of the motor the desired amount. Each balance piston is fixed to the motor frame and bears at its upper end against a lug attached to the motor. Thus, changes in the pressure behind the pistons are transmitted directly to the motor, thereby increasing or decreasing its effective weight.

The amount of the pressure behind the counter-balance pistons can be varied by the operator at will by control of the air pressure in the hydraulic balance system. In practice, the object is to adjust the counter-balancing system so that the weight exerted on the grinding wheels will be such as to secure maximum grinding efficiency. This weight depends somewhat on the type of grinding wheel that is in use at any given time, but ordinarily the correct pressure is achieved by introducing an air pressure of 13 lb. per sq. in. into the balancing system. This system also affords a means of raising all the grinding wheels off the rails simultaneously without raising the trucks, this being accomplished by introducing the full available air pressure into the system. The fluid used in the balance system consists of a neutral oil.

To prevent personal injuries due to flying pieces of broken grinding wheels, each wheel is enclosed by a circular steel guard which forms part of the motor frame. Supplementing these guards is a strip of 1/16-in. sheet iron, about 14 in. wide, which is hung in front of the three grinding wheels on each truck. This guard is fastened to the ends of the brackets supporting the motors in such a manner that it can be easily removed or lifted up to permit inspection of the grinding wheels.

Engine-Generator Sets

Electric power for operating the grinder motors is produced by two alternating-current 75-kva. generators, with direct-connected direct-current excitors, each generator being driven by an eight-cylinder Diesel engine. The engine-generator sets are arranged at opposite ends of the car on the centerline. In one corner at each end of the car is provided a 32-volt battery for starting the Diesels and for emergency lighting of the interior of the car. An 840-gal. fuel oil storage tank is centrally located in the car between the engine-generator sets and is flanked at one end by a lubricating oil storage tank having a capacity of 120 gal.

The fuel oil tank may be filled either by gravity through a filling connection of the safety-screened type or by means of a motor-driven fuel oil transfer pump which is located underneath the lubricating oil storage tank. A suitable hydrostatic gage indicates the height of the fuel oil in the supply tank, and an atmospheric vent for this tank is provided. Water for the engine radiators is supplied from two 342-gal. tanks which are suspended from the roof at the ends of the car, a hose being furnished for transferring the water from the supply tanks directly into the engine radiators.

Also located overhead in the car are two air reservoirs, one for operating the lifting mechanism for each truck, in which the pressure is maintained as closely as possible to 90 lb. per sq. in., this being approximately the pressure required to raise the trucks. Mounted on one wall of the car is the pressure cylinder serving the motor-balancing system, into which air is admitted through a pressure regulator. Pressure gages placed at convenient points indicate the pressure in the air reservoirs, the cylinders and in the motor-balancing system. Hand levers for raising and lowering the trucks and for adjusting the pressure in the balancing system are placed near the center of the car, while the handwheels for raising and lowering individual motors are arranged in rows directly above the motors.

Individual Control Switches

Each grinder motor is controlled individually by a circuit-breaker type control switch embodying a thermostatic feature which causes the switch automatically to cut out when the temperature of the motor reaches a certain point. The six switches controlling the motors on each side of the car are mounted on the side wall of the car directly above the motors, while switches for the control of the car lighting system are disposed at convenient locations. For night operation, the lighting system includes small electric lamps mounted on the exterior underneath the car and at the ends.

To adapt the steel box car for use as a grinder car, extensive alterations were made. These included the provision of four ventilator hatches in the central portion of the roof, the installation of four glazed windows and four ventilating louvers in each side wall, and the replacement of the timber floor of the car with a steel floor to reduce the fire hazard. To permit the grinding operations to be viewed from the interior of the car, rectangular areas of steel grating are placed in the floor over the motors, which are protected by means of removable cover plates. In addition, doors have been provided in the ends of the car, and the side doors, except for narrow openings, are enclosed with pipe hand rails. Appurtenances on the interior of the car not mentioned previously include a tool and supply cupboard with a padlocked screen door, four lockers for the crew, and a number of fire extinguishers.

In the operation of the car, the six grinder motors over each rail are so adjusted that successive wheels grind adjacent strips on the rail head. Thus, allowing for a slight overlapping of adjacent strips and assuming that the individual strips are about ¼ in. wide, the combined width of the six strips amounts to approximately 1¼ in. When starting the grinding operation, the work is begun on the gage side of the rail and one pass over the track is made with the grinding wheels in this position. For the next pass of the car all motors on each side are tilted ¼ in. in the outward direction so that the 1¼-in. strip that is ground during this pass is ¼ in. nearer the outside of the rail head. This operation is continued, the car being operated back and forth over the section of track until the entire running surface of each rail has been covered, requiring about four passes of the car. In succeeding passes the operation is reversed, the grinding wheels being moved in successive steps back across the rail head toward the gage side. This process is continued until all evidence of rail corrugations has been removed.

From the foregoing, it will be seen that the center of the rail head receives the most attention and that here (still assuming the individual strips are ¼ in. wide) a strip about ¾ in. wide is ground during every pass of the car, while in each direction from this strip the number of passes that take effect relative to the number received at the center of the rail tapers off toward the edges of the rail head. In this manner, consideration is given to the fact that rail corrugations are deepest in the vicinity of the center of the rail head and that the depth of the corrugations tapers off both ways towards the edges of the rail.

Number of Passes Required

The number of passes that the grinder car must make in order to efface corrugations depends, to a large extent, on the depth of the corrugations, although in some measure it is affected also by the section and age of the rail. In general, an average of 8 to 12 passes of the grinder car is required where the corrugations have a maximum depth of 0.008 in., although at locations where the corrugations have unusual depth the number of passes required may run somewhat higher.

The grinder car is drawn by a switch engine and experience has shown that it produces the best results when it is pulled at a speed of about two miles per hour. The output depends, of course, on the condition of the rail and the extent to which traffic interferes with the operation, and ranges between 1½ and 4 miles of track in a two-shift day, the average being about 3 miles.

In addition to a four-man train crew (engineman, fireman, conductor and flagman) the personnel required on the grinder car consists of an operator-foreman and a machinist's helper. The car is also accompanied by an assistant supervisor or an engineering assistant from the office of the supervisor who acts as the inspector on the job.

Trains Routed Around Car

During the 1938 season, the car operated altogether on the four-track Chicago-New York main line of the Pennsylvania. This is high-traffic-density territory and, to restrict time losses to a minimum, as many trains as possible were routed around the grinder car. This type of operation requires that close contact be maintained between the grinder car and the dispatcher and, to effect this contact, the conductor of the grinder car remains constantly at one of the telephones on the dispatcher's line that are maintained at intervals of about 1½ miles. It thus becomes necessary for the grinder car to remain relatively close to the conductor so that signals may be exchanged and, for this reason, the track is subjected to the grinding operation in increments averaging about ½ mile in length, the length depending on varying local conditions, such as curvature, that affect visibility.

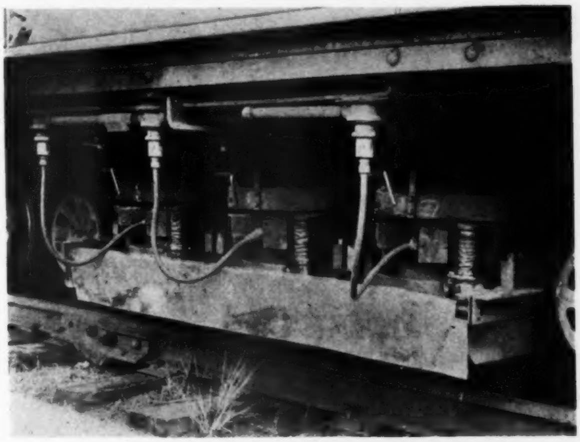
So well pleased has the Pennsylvania been with the performance of its grinder car that it has undertaken the construction of an entire fleet of the cars. Since each car of the type described above has sufficient generating capacity for operating the grinder motors on an additional car, the fleet, including the original unit, will consist of an equal number of power and trailer cars. The cars now under construction include seven power cars, which are substantially identical to the original car, and eight trailer cars which differ from the other cars only to the extent that they are not equipped with generators.

The fleet of cars will be operated in units of two each, including a power car and a trailer car. As a general rule it is planned to operate two units (four cars) together, although a fewer or greater number of the cars may be operated together depending on conditions. Under this plan of operation the number of passes required to efface corrugations of any given depth will be reduced in inverse proportion to the number of cars used and the cost of doing the work will be substantially reduced.

To Grind All Main Tracks

With the greater grinding capacity available the railroad plans to grind practically all its main track rail at intervals which will depend on the amount of traffic passing over the rail. New and relayer rail will be ground when laid to even up the joint surfaces and to eliminate any intermediate surface imperfections. It is also planned to follow up rail-end welding operations with the grinder cars. It is estimated that a four-car unit is capable of grinding the rail on about 750 miles of track in a year and that the 16 cars will grind about 3,000 miles of track per year.

The Pennsylvania's grinder car was designed under the general supervision of W. D. Wiggins, chief engineer of the system, by Robert Faries, assistant chief engineer-maintenance, and J. G. Hartley, assistant engineer.



Close-Up of One of the Trucks with the Wheel Guard in Position

The New Siding Greatly Improved the Appearance of the Station

Chicago, Rock Island & Pacific

Modernizes Passenger Station at Modest Expense

Converts an old-fashioned frame depot at Manhattan, Kan., into an attractive station at reasonable cost by providing plywood walls and ceilings, new linoleum floors and new asbestos-cement siding; by installing new lighting fixtures and heating facilities and by repainting

RECENTLY citizens of Manhattan, Kan., a college town of approximately 10,000 population, noticed a new depot which had been built by the Rock Island to replace one destroyed by fire at Belleville, Kan. These citizens compared the new depot at Belleville with the old fashioned frame structure at Manhattan and demanded the modernization of their station to make it comparable with that at Belleville. As a result, the Rock Island drew up plans for remodeling and redecorating the old frame structure to make it acceptable to the people of Manhattan.

The old depot was built many years ago as a combination freight and passenger depot. It is a typical one-story frame station building approximately 110 ft. long by 22 ft. in width, built parallel with the tracks which run through the town in a northwesterly direction. It had a steep pitched roof, wide eaves and high, narrow windows set close to the ground, with transoms above.

A number of years after the depot was built, traffic increased to such an extent that the Rock Island built a separate freight station and the depot waiting room was enlarged to include most of the former freight room space, leaving only a moderate size baggage room at the west end. This made a large main waiting room for this station, approximately 55 ft. by 22 ft. in area. More recently, traffic declined to the point where the separate freight station was no longer necessary while the main waiting room was larger than required for the volume of passenger traffic now handled. As a result, it was again practicable to handle both passenger and freight business in the one building.

Arrangement of Old Depot

At the time the changes were undertaken, the old depot consisted of a baggage room at the west end 22 ft. by 11 ft. in size, adjoining a smoking room facing the track and a men's toilet room behind the smoking room, the former 12 ft. 6 in. by 12 ft. and the latter 12 ft. 6 in. by 10 ft. in area. The smoking room opened into the main waiting room and into the men's toilet. The main waiting room was 55 ft. by 22 ft. in area, with three outside doors on the track side and two doors at its east end, one leading to the ticket office and the other to the entrance vestibule behind the ticket office.

In the ticket office an operator's bay window 12 ft. 6 in. wide faced the track. An entrance vestibule, approximately 13 ft. by 8 ft. in size, extended 3 ft. beyond the main wall of the building at the rear, with a double door at the back of the depot providing entrance from the outside and a glazed door at the east end leading to the women's lounge. The women's lounge, in the east corner of the depot next to the track, was approximately 19 ft. by 16 ft. in area. The women's toilet was located behind the women's lounge and was entered from that room.

Changes in Arrangement

The rearrangement of the depot involved the removal of the men's toilet and smoking room partitions and facilities and the building of a partition to provide a baggage and freight room 48 ft. 7 in. by 22 ft. in area, which reduced the size of the

main waiting room to 28 ft. by 22 ft. Two doors in the west wall of the main waiting room lead to the new men's toilet, which was enclosed in the east corner of the new baggage and freight room next to the track, and to the baggage and freight room. The ticket office was enlarged to provide space for a combination ticket and freight office by moving the partition 7 ft. 6 in. into the women's lounge. In addition, a janitors closet was added at the rear of the building, a 17-ft. by 6 ft. 6-in. coal storage bin was built behind the depot opposite the east end of the baggage and freight room, and a concrete-lined boiler pit 6 ft. deep was constructed under the east corner of the baggage and freight room adjoining the new coal storage bin, with a stairway and handrail leading down. Also an 8-ft. by 14-ft. scale was moved from the freight house to the new baggage and freight room, and the baggage room door was moved from the track side to the end of the depot.

Exterior Improvements

All of the old windows around the new freight and baggage room were removed and smaller windows were installed, set high in the walls. In the remainder of the station several of the windows and one of the doors leading from the waiting room to the track were eliminated and the sills of the rest of the windows were raised to a standard height above the floor. The transoms above the windows were removed, this change in the windows giving the depot a much more up-to-date appearance.

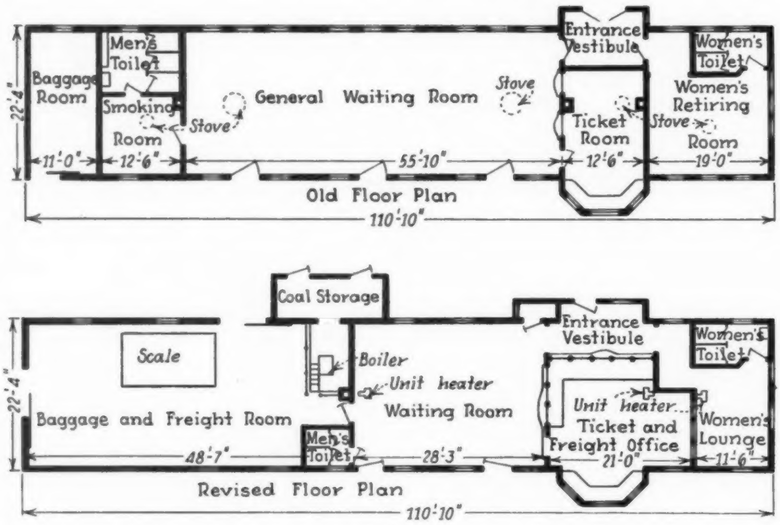
The old 4-in. lap siding on the outside of the depot was removed from the wainscoting level up to the top of the windows and replaced with light gray cedar-grain asbestos-cement siding. The exterior woodwork was repainted a dark green below the wainscoting, and a primrose yellow above the asbestos siding. Dark tan trim was used for windows and doors. The roof of the depot, which was of green asphalt shingles in good condition, was not changed except for the work that had to be done in connection with removing four chimneys, building one new chimney, and installing a ventilator for roof ventilation.

Interior Improvements

The walls and ceilings in the interior of the old depot were of V-joint ceiling, with a varnish finish, which was in poor condition. In addition, the woodwork was badly fly specked. To correct this condition, the interior of the waiting room, the women's lounge and the vestibule were lined with plywood. A new ceiling of plywood was also built about 4 ft. below the level of the old ceiling which was unusually high, being about 16 ft. above the floor. The plywood ceiling and walls were painted an attractive light gray color down to the wainscoting, and below this level the walls were painted a shade of tan which harmonized with the gray of the upper walls. The woodwork and the wainscoting strip were painted a darker shade of tan. Aluminum colored molding strips which hold the plywood in place, provide an attractive combination with the light gray color of the walls. An additional modernistic and decorative effect was secured by three parallel strips of this molding just below the ceiling.

A maple floor in good wearing condition but badly discolored by oil and dirt was covered with new battleship linoleum of a solid maroon color. The old waiting room seats, which were of the park-bench type with iron arm rests, were replaced with two double and one single solid oak settees refinished and painted gray with tan trim to harmonize with the walls. The old ticket windows were replaced with one window and with a panel of maze glass set in place of the old grillage on each side of the new ticket win-

Right—The Interior of the Remodeled Main Waiting Room, Showing New Plywood Walls and Ticket Window — Above —The West End of the Main Waiting Room Showing One of the New Ceiling Lights and Modine Unit Heaters



Floor Plans of the Station Before and After Modernization

dow. The ticket window grille was painted aluminum color to match the walls. A new freight office window was provided at the back end of the office, opening on the vestibule, similar to the ticket window, and new counters and cupboards were built in the office. Open grillwork was built in the partitions near the top of the wall and painted a light gray.

A 12-in. Dickinson ventilator was provided in the roof of the depot to ventilate the air space between the new and the old ceilings, to aid in maintaining a lower temperature in the depot during the summer, and a new modern drinking fountain was placed in the vestibule.

Toilet facilities were placed in first class condition, and, in addition, the obsolete and inefficient lighting fixtures were replaced with new wiring and modern lighting fixtures.

Heating Facilities

New heating facilities consist of a hot water boiler in the boiler pit and three Modine unit heaters, one of which was placed in the main waiting room, another in the office and a third in the women's lounge. The lowering of the ceiling has made the depot much more comfortable and easier to heat in the winter, and the removal of the unsightly cast-iron station stoves was a big factor in improving the appearance of the interior.

The total cost of these improvements amounted to $6,965, including $5,755 for decoration and alteration of the depot itself, $888 for heating and plumbing and $322 for new electric lighting, wiring and fixtures. This work was done under the general supervision of Robert H. Ford, chief engineer and A. T. Hawk, engineer of buildings, Chicago, and under the direct supervision of T. C. Fredericks, then assistant engineer of buildings.

English Officer Compares Practices

(Continued from page 79)

considerably and in some cases do away with them entirely. As an example, at an important junction in Scotland we increased a 20 mile-an-hour limit to 40 miles an hour, and at one place on our main line we raised the limit from 30 miles to 55 miles an hour.

We put up our elevation for average speed. If you will multiply the average speed in miles per hour by 1.61, you will get the length of chord that we use, and the offset at the center gives you a distance which should equal the elevation at that point. At 50 miles per hour we have an 80-ft., 6-in. chord. We fix a maximum elevation of 6 in., except in a few places where we have practically no slow running, in which places we use 7 in.

One of the things we found when we started running trains at high speed was that our transition curves were too short in many cases. Our minimum spiral is now five half chords. We usually gain elevation at the rate of one inch per half chord, the length of the half chord depending upon the speed. That means that for 60 miles an hour, the half chord will be 48 ft. long and the minimum spiral length 240 ft. Knowing enginemen and the fact that locomotives are not fitted with speed recorders except in a few cases, we put the restrictions on the safe side because we realize that they will run 10 or 15 per cent faster than that. For instance, on a 3-deg. curve with 3-in. elevation we fix a 45 mile-an-hour speed limit and expect trains to run it at 55, and so on. Ninety miles an hour is the fastest speed that we deal with.

Rigid Frogs Are Standard

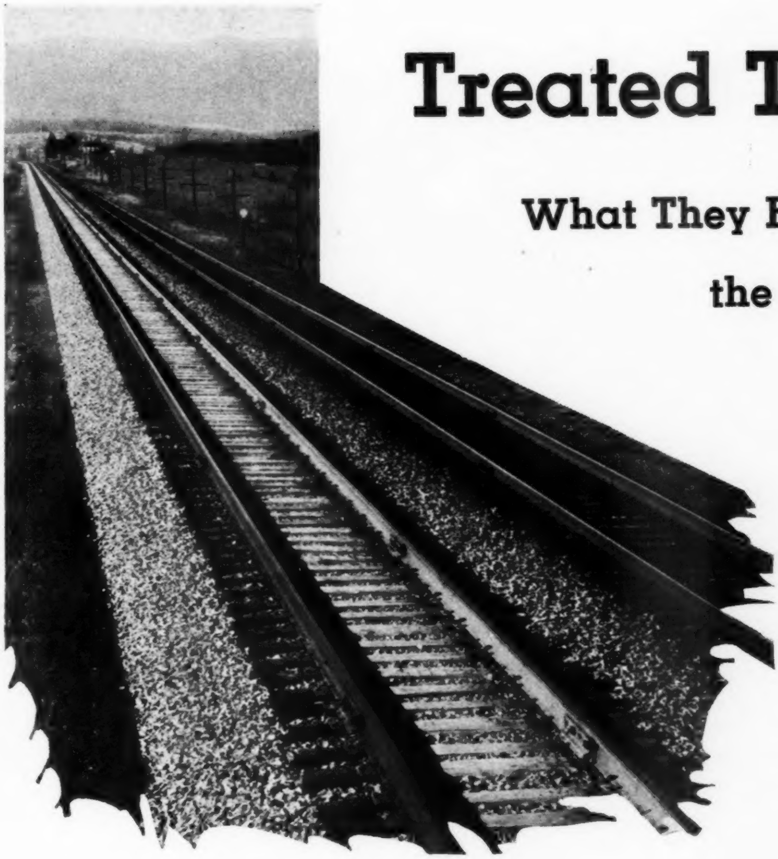
All frogs in Great Britain are made of ordinary rails. We have no rail-bound or self-guarded frogs, and, except on the Southern, spring frogs are unknown. We are going to try some of those but it is much harder to get a satisfactory spring frog with a bull-head rail than with your type of rail. In very busy junctions and curves where rail wear is abnormally severe we use high manganese rails of, say, 14 per cent manganese, of the rolled section, but the cost restricts its use.

We use rail oilers freely to prevent cutting the high rail on curves. We have 600 oilers in use on the L.M.S.

It is our usual practice to build up frogs on the wings and points when they wear under traffic, usually by electric welding, although oxy-acetylene is coming in now. The Southern was the first road in England to use it. That road has welded more than 11,000 frogs. We have welded 8,500. Some of our frogs have had four and five build-ups. We now have 23 electric and 10 oxy-acetylene welders working constantly. We had some trouble at first by trying to get too hard a deposit, but now we use about the same Brinnel hardness as the rail and are having very little trouble.

I have touched upon a number of our problems and what we are trying to do to solve them. As I have said, we have much to learn from you and we are very grateful indeed for the way in which you place your information at our dispostal. And I suggest that some of the things we do would be worth your consideration, not for adoption, but for adaptation to your conditions. You can very seldom take a thing straight from one place and use it in another place.

We, like you, are bringing in the aid of the scientific man. We have Prof. Inglis of Cambridge University, just as you have Dr. Talbot and others helping you. In this way we hope to see all sides of the problem, because it is very important to get all sides. If you only get part of the problem you are apt to get it wrong.



Treated Ties—

What They Have Meant to the Norfolk & Western*

By W. H. BETTIS
Maintenance Engineer,
Norfolk & Western

SINCE its organization, the Norfolk & Western has been a large consumer of timber, most of which is obtained from producers on its own lines. The first treated timber used consisted of piling and lumber for the foundations for bridges at Norfolk, Va., in 1886, and for a coal pier in 1890. Untreated piling used for bulkheads in this territory did not last more than four years, its strength being impaired by attack of teredo. The use of treated material was confined to work along the seaboard for many years.

Because of the rapid rise in the costs of labor and materials, beginning in 1916, it became necessary to give consideration to the treatment of crossties, switch timber and bridge lumber in order to extend the life of these materials. The average life of untreated white oak crossties and switch timber in main line tracks at that time was about 7½ or 8 years; untreated white oak bridge ties averaged about 8 years. Untreated pine stringers and caps gave an average life of about 12 years, while posts and bracing averaged about 20 years. The average life of untreated chestnut poles was about 12 years. In the years preceding the World War the company maintained a large number of timber bridges on branch lines and the cost of maintenance of these bridges was increasing steadily, owing to the advancing costs of material and labor and the demand for stronger structures to take care of the increasing weight of equipment and increasing traffic.

*A paper presented before the annual convention of the American Wood-Preservers' Association at Washington, D. C., on January 25.

The Plant

In 1920 we started the construction of a modern timber preserving plant at Radford, Va. This plant was completed in the following year, at a cost of more than one million dollars, including property and grading. It occupies about 124 acres of land and has approximately 13½ miles of track. The plant has two retorts, each 140-ft. long and 7 ft. in diameter; two storage tanks of 225,000 gal. capacity each; two working tanks of 50,000 gal. capacity each; an underground tank of 30,000 gal. capacity, and other necessary equipment. It is also equipped with a tie adzing and boring machine and a framing mill for the framing of bridge ties and structural timbers.

The capacity of the seasoning yard is as follows:

Crossties	1,000,000 pieces
Switch ties and other dimensional timbers	5,000,000 ft. b.m.
Piling and poles	30,000 lin. ft.

The capacity of the storage yard for treated material is as follows:

Crossties	300,000 pieces
Switch ties and other dimensional timbers	3,500,000 ft. b.m.
Piling and poles	100,000 lin. ft.

The plant is so arranged that any of the empty-cell or full-cell processes or the Card process, can be used. Its annual treating capacity is 6,000,000 cu. ft. of air seasoned material, or 1,400,000 cu. ft. of materials requiring steaming.

Actual treating of material at the plant began in September, 1921, and from that date to the end of 1938 the following total quantities of material have been treated:

Crossties—white and mixed oak	14,697,494 pieces
Bridge ties—white and mixed oak	5,096,735 ft. b.m.
Switch timber—white and mixed oak	45,238,082 ft. b.m.
Pine lumber	38,648,328 ft. b.m.
Oak lumber	455,089 ft. b.m.
Land piling	265,408 lin. ft.
Marine piling	802,840 lin. ft.
Transmission poles	1,605,029 lin. ft.
Pine pole stubs	72,872 lin. ft.
Cross arms	1,736,958 h. b.m.
Tie plugs	58,650,000 pieces
Miscellaneous material	2,000,000 cu. ft.

All of this material, except marine lumber and marine piling, was treated by the Rueping or empty-cell process. Marine lumber and marine

piling were treated by the Bethel process.

From 1921 to the middle of 1932, the preservative used was straight No. 1 creosote oil. We then used, for about one year, a mixture consisting of 80 per cent creosote and 20 per cent coal tar, but there was little difference in the cost of the creosote-coal tar solution as compared with straight creosote oil and we went back to the use of straight creosote oil. We are now beginning to use an 80 per cent creosote, 20 per cent petroleum solution, as we believe, from information available, that we will get satisfactory results and will be able to reduce the cost of preservatives.

The Results

At the time our plant was constructed we required about 1,600,000 crossties and about 5,000,000 ft. b.m. of switch timber annually, while at the present time our requirements are about 200,000 crossties and about 500,000 ft. b.m. of switch timber, this large reduction having been accomplished through the general use of treated timber. Our records indicate that we have not removed more than 10 per cent of the first treated ties installed in 1921 and 1922. According to the Goltra yardstick, this indicated an average life of 30 years. We do not, however, expect an average life of more than 20 years and perhaps less than 20 years from ties placed in heavy traffic tracks on curves. The regaging which is necessary from time to time causes the ties to become spike-cut, and, regardless of the use of treated tie plugs, finally permits decay in the tie plate seats and materially shortens the life of the ties. The use of improperly placed anti-checking irons likewise shortens the life of ties. It is our practice, when treated ties are adzed in the field, to require the application of one or more coats of hot creosote oil to the scored surfaces.

From 1920 to 1929 we used 7-in. by 11-in. tie plates which were not lagged to the ties. After a few years service in heavy traffic tracks we found that these plates were becoming imbedded in the ties, because of mechanical wear and insufficient area of bearing, causing injury to the ties and making excessive adzing necessary when the plates were renewed. In 1929 we adopted a larger tie plate, 8 in. by 13½ in., and when these plates were installed they were properly lagged to the ties. The use of this large plate has undoubtedly been beneficial to the ties. We expect a greater average service life from the treated ties which we have installed since the adoption of these larger tie plates.

Tie Renewals Decrease

The average annual renewal of crossties for the ten-year period from 1916 to 1925 was 1,483,200, or 353 ties per mile of track. The average annual renewal of crossties for the ten-year period from 1929 to 1938 was 482,896, or 104 ties per mile of track. In 1938 we required only 137,545 ties for renewals, or about 31 ties per mile of track. On this basis the approximate average annual saving in the use of treated crossties during the last ten years has been nearly $1,000,000, as compared with the use of untreated ties. Nearly all of the ties now in tracks of our railway are treated and we should be able, within the next few years, to determine the average life to expect.

We are now preframing and treating our bridge ties and expect to greatly increase their life thereby. The treating of pine and oak bridge lumber will, we think, at least double its service life, with the possible exception of posts and bracing, although we have not yet renewed a sufficient amount of this treated lumber to enable us to estimate what approximate life we will get from it. We have been treating the poles used in our transmission lines since 1927 and indications are that we will get an average service life 20 years or more from them.

Untreated second-hand timber released from abandoned structures, or from structures requiring major repairs, is shipped to the treating plant, where it is cut back to sound wood and then treated and placed in stock for reuse. Much of this material is used for cribbing, temporary track supports, curbing for station platforms and other purposes.

Treated ties released from abandoned branch lines are used in yard tracks and light traffic branch lines. Released untreated bridge ties, if usable, are treated and later used for blocking and cribbing.

The Care of Treated Fence Posts

IN a report presented at the annual convention of the American Wood Preservers Association at Washington, D. C., on January 25, the Committee on Post Service Records presented as information the following suggestions for the handling of treated fence posts:

(a) Utmost care should be exercised when handling treated posts to avoid fracture, chipping and splitting, so as not to expose the untreated wood.

(b) Pointed or edged tools should not be used.

(c) Posts should not be dropped in a manner or for distances that will cause fracturing or splintering.

(d) All cutting, framing and boring of the treated portion of the posts should be done before treatment.

(e) Necessary cutting and framing after treatment should be brush treated as thoroughly as possible.

(f) All holes bored after treatment should be retreated with a pressure hole treater.

(g) Creosoted posts that are not to be used immediately after treatment should be close-piled to reduce the fire hazard and to reduce the possibility of splitting and checking.

(h) Posts that have been given a water-borne preservative treatment should be open-piled off the ground for at least two weeks, and longer if possible, before being put in service, to remove as much of the water added in treatment as possible.

(i) Butt-treated posts that are not to be used immediately after treatment should not be allowed to lie on the ground, as decay might start in the untreated top. They should be open-piled off the ground.

(j) In setting butt-treated posts, they should be installed so that at least six inches, and preferably more, of the treated wood extends above the ground line.

(k) All posts should be set with a post hole digger instead of being driven, as driving may cause considerable damage.

(l) All holes made in treated posts to determine penetration should be plugged with treated plugs.

Two More Roads Announce Track Awards

AS in recent years, the practice of making annual or periodic track inspections for the purpose of rewarding local maintenance officers and section foreman for excellence in track maintenance, was continued in 1938 by a relatively small number of roads, including the Chesapeake & Ohio, the Pennsylvania and the Norfolk & Western. The results of the annual inspection on the Norfolk & Western were announced in the December issue, while those for the Chesapeake & Ohio and the Pennsylvania are given below.

Chesapeake & Ohio

On the Chesapeake & Ohio, cash prizes were awarded on the basis of an inspection made with this company's roadway inspection car which contains facilities for graphically registering track surface, cross level and alinement. For purposes of the inspection, this car was incorporated in a special train consisting of office cars, pullman sleeping cars and a dining car, which was operated during the inspection over all the company's main lines and principal branch lines.

Supplementing the record provided by the mechanical equipment in the inspection car, a committee composed of two judges and a referee graded each mile of track as to appearance and other qualities not subject to mechanical determination. In the final computation of grades, the machine records were given a value of 70 and the committee ratings a value of 30.

In arriving at the grades for the 1938 inspection prizes, records obtained in operating the inspection car over principal tracks during March and July, 1938, were combined with those secured by operation of the car in the inspection train. Thus, in effect, the grading was based on conditions existing throughout the year, rather than at the particular time of running the inspection train.

To place the track data obtained during the inspection on a comparable basis, the territories traversed were divided into five groups according to the character of the track and the class of traffic handled. The general grouping plan was as follows: Group 1—double-track main lines, freight and passenger traffic; Group 2—single and double-track main lines, principally freight traffic; Group 3—single-track main lines, principally passenger traffic; Group 4—secondary branch lines; and Group 5—yard and terminal territories.

In Groups 1 and 2, prizes of $50, $40 and $30 were awarded to supervisors receiving the first, second and third highest ratings, respectively in each group, and in Groups 3, 4 and 5 prizes of $50 and $40 were awarded for the first and second highest ratings in each group. In addition prizes of $50 each were awarded to two supervisors—one in Groups 1 and 2 and the other in Groups 3, 4 and 5—whose territories evidenced the greatest improvement as compared with the previous year. Prizes to section foremen took the form of $25 and $15 cash awards to those foremen having the best and second-best maintained sections on each supervisor's territory.

The names of the supervisors who won the prizes in each group are given in the following:

Group 1—First prize—J. H. Poindexter, Peninsula district; second prize—J. Henzman, Charleston district; third prize—R. C. Patton, New River district.

Group 2—First prize—J. F. Painter, James River district; second prize—H. S. Chandler, Rivanna district; third prize—O. C. Ewers, Paintsville district.

Group 3—First prize—R. C. Watkins, Mountain district; second prize—C. A. Snodgrass, Miami district.

Group 4—First prize—J. A. Bragg, Cabin Creek district; second prize—D. F. Apple, New River branch lines.

Group 5—First prize—P. L. Koehler (assistant division engineer—Russell division; second prize—F. A. Dirnberg, Maumee district.

The improvement prize for Groups 1 and 2 went to J. G. Gilley, supervisor of the Shelby district of the Ashland division, while the same prize for Groups 3, 4 and 5 went to J. A. Bragg, supervisor of the Cabin Creek district of the Huntington division.

Pennsylvania

On the Pennsylvania, the various subdivisions, as in recent years, were rated on the basis of periodic inspections made throughout the year by special track inspection committees headed by the chief engineer maintenance of way of each region. At the end of the year, letters of commendation from their superior officers were sent to those supervisors whose territories received the highest ratings for excellence in track maintenance on the respective regions of the road.

In addition, those track foremen whose territories were given the highest ratings on their respective subdivisions were commended by letter by their division superintendents. The names of the supervisors and their assistants (where they have assistants) whose territories received special commendation, together with their headquarters are given in the following:

New York Zone—New York division—J. J. Clutz, Trenton, N. J.; J. P. Hiltz, Jr. (assistant). Long Island railroad—Lee Spencer, Jamaica, L. I.

Eastern Region—Maryland division, main line—E. A. Werden, Wilmington, Del.; W. T. Rice (assistant). Maryland division, branch line—E. G. Adams, York, Pa. Middle division, main line—P. M. Roeper, Newport, Pa.; W. G. Pfohl (assistant). Middle division, branch line—R. H. Joyce, Tyrone, Pa. Philadelphia division, main line—E. R. Shultz, Lancaster, Pa.; J. C. Warren (assistant). Philadelphia division, branch line—L. A. Evans, Enola, Pa.; J. W. Buford (assistant). Philadelphia Terminal division—G. M. Hain, Philadelphia, Pa.; A. D. Kerr (assistant). Delmarva division—K. J. Silvey, Harrington, Del. Williamsport division—H. L. Byrne, Williamsport, Pa. Wilkes-Barre division—R. S. Dunkle, Sunbury, Pa.

Central Region—Best of all supervisers' subdivisions—C. R. Sanders, Pittsburgh division, main line, Trafford, Pa. Eastern division, main line—C. R. Montgomery, Mansfield, Ohio. Panhandle division, main line—J. C. Dayton, Newcomerstown, Ohio. Eastern Panhandle divisions, branch line—J. P. McGhee, Wellsville, Ohio. Pittsburgh division, branch line—M. J. Miller, Barnesboro, Pa. Conemaugh division—F. E. Flynn, Kittanning, Pa. Monongahela division—O. L. Fisher, Youngwood, Pa. Buffalo division—T. M. Goodfellow, Olean, N. Y. Renovo division—T. M. Woodward, Kane, Pa. Cleveland division—Jos. Conlon, Alliance, Ohio. Erie and Ashtabula division—M. S. Smith, New Castle, Pa.

Western Region—Fort Wayne division—P. O'Connor, Crestline, Ohio. St. Louis division—W. P. Conklin, Terre Haute, Ind. Columbus division—D. Lewis, Richmond, Ind. Cincinnati division—A. W. Miller, Xenia, Ohio. Chicago Terminal division—H. W. Manning, Colehour, Chicago. Logansport division—John Nowviskie, Crown Point, Ind. Toledo division—C. V. Frish, Carrothers, Ohio. Grand Rapids division—H. E. Michael, Kalamazoo, Mich. Indianapolis division—J. H. Ault, Jeffersonville, Ind.

WHAT'S the Answer?

Should Foremen Ride Trains?

Should section foremen be required or encouraged to ride over their sections on locomotives or trains to determine the riding qualities of their track? If so, how often should this be done? Why?

Does Not Believe in It

By Thomas Walker
Roadmaster, Louisville & Nashville, Evansville, Ind.

Foremen should not be required or even encouraged to ride over their sections on locomotives or trains to determine the riding qualities of their track; this applies particularly to locomotives. It is doubtless desirable for section foremen to ride over their sections from time to time, when it can be done conveniently without interfering with their duties, and if this can be done without loss of time. It is not desirable, however, to require or even encourage them to ride locomotives.

Unless a man is used to riding locomotives and is familiar with their riding characteristics, and in some cases those of particular locomotives, he can scarcely be qualified to pass upon the riding qualities of his track. He may, therefore, get a false impression of the condition of his track as a result of the trip. As far as the riding condition of the track from the locomotive standpoint is concerned, it is best to depend on information given by enginemen. They ride over the track day by day and since they are familiar with the riding characteristics of the locomotives they are better judges of track conditions from the riding standpoint than the foreman can be, since he can ride only occasionally.

In general, the foreman can tell more about his track by riding over it on his motor car and from actual close inspection than he can from a locomotive or train. On the other hand, when he has a chance to ride over his section on a train he should be at some pains to note the riding conditions, as this should be of some help to him in taking care of his section.

Supervisors, roadmasters, division engineers and other officers are required by their duties to ride trains frequently and can judge of the riding qualities of the track while doing so. Personally, I can judge the riding characteristics of track better from the rear end of a train than from a locomotive, largely because I am more familiar with the riding conditions of cars than of locomotives.

Favors the Practice

By B. E. Haley
General Roadmaster, Atlantic Coast Line, Lakeland, Fla.

For many years this road had standing instructions that section foremen should ride over their sections on locomotives at least once every two weeks. With the advent of ballast, heavier rail and higher standards of maintenance the practice was gradually abandoned, so far as positive instructions were concerned. Yet it is permitted and is continued today to a considerable extent. When a section is not riding satisfactorily, the foreman is instructed to make frequent trips over his section on a locomotive. We have found it to be an excellent practice and encourage it, and even require it in specific cases.

I know of no better method of locating and remedying the defects in surface and line. Any intelligent foreman can locate the bad spots much better from the locomotive than they can be pointed out to him by the roadmaster. In all cases, the trip should be made on the locomotive. With the improvements that have been made in the riding characteristics of coaches and Pullmans, it is

Send your answers to any of the questions to the What's the Answer editor. He will welcome also any questions you wish to have discussed.

To Be Answered in April

1. *How does the size of ties, with respect to width, depth, length and uniformity of dimensions affect track maintenance?*
2. *What are the causes for failures in built-up roofing? What can be done to prevent them?*
3. *What are the most effective means for increasing the lateral stiffness of the track, independent of the weight of rail?*
4. *In what ways can compressed air be used to advantage in bridge and building work?*
5. *Are emergency rails on each section necessary? If so, how many? Where should they be located? Should they be retained unused until needed? Why?*
6. *What is the cause of air pockets in pipe lines? The effect? The remedy?*
7. *In what ways can motor trucks be used to advantage in track maintenance?*
8. *What is an extender in paint? What is its purpose? What are the advantages and disadvantages?*

sometimes difficult to detect, or at least to differentiate between, defects in the track. The same improvement has not been made in the riding quality of locomotives, for which reason it is my belief that foremen should be required to confine their riding to locomotives. It is scarcely necessary to say that at present, owing to increased speeds, it is necessary to keep a closer watch on the riding qualities of the track than has ever before been necessary. This requirement is certain to become still more rigid in the future and I think it is an excellent idea to give foremen a visual lesson on the riding qualities of their track. If it does nothing else it arouses their interest and convinces them that the roadmaster is thoroughly sincere when he gets after them for having track that does not ride smoothly. In other words, they not only become more receptive to this form of criticism but are more interested in overcoming the defects.

Hardness of Paint Coats

Should the undercoats of a painting job be harder than the finishing coat? Why? How is this accomplished?

Prevents Alligatoring

By W. E. Gardner
Principal Assistant Engineer, Wabash, St. Louis, Mo.

If the finishing coat of a painting job is made harder than the underlying coat or coats, serious trouble will be experienced from checking and alligatoring. It is rarely that this trouble is experienced where a good quality of paint is used, except when insufficient time is allowed between the application of the coats.

A high pigment content is desirable in the undercoats to produce a hard coating. This high percentage of pigment is sometimes provided in special formulas for undercoating. With the use of regular paint, the addition of linseed oil and turpentine, and sometimes driers, seems to result in a reduction in the quantity of pigment. A priming coat placed over a surface that absorbs a part of the oil, dries to a hard thin film in which the pigment content is high, when it has been reduced properly by the addition of oil and thinners. The thinners not only thin the paint but they increase the speed of evaporation of volatiles in the oil.

In enamel work, a priming coat with a high pigment content is very desirable to prevent the enamel coats from sinking into the undercoats and thus reducing the permanent gloss finish. To secure a multi-coat enamel job, the enamel primer and undercoats usually have a degree of hardness graduated so that each succeeding coat is absorbed slightly into the preceding coat to build up a homogeneous film.

In painting steel surfaces, it is a good policy to have a high concentration of pigment next to the metal. This not only insures better adhesion, but if the pigments have good rust-inhibiting value, it is obviously advisable to have the heavy concentration next to the metal.

In general, when the manufacturer's recommendations for the preparation of his paints are followed and sufficient time is allowed between the application of the successive coats, no trouble should be experienced with respect to the relative hardness of the individual coats. If the paint has been prepared according to a special formula the instructions should be followed precisely, to insure the correct thinning of the priming coat so that it will penetrate the wood, as well as to produce a rapid-drying hard coat. The thinners evaporate quickly and at the same time speed up the rate of evaporation of the volatiles in the vehicle.

Should Always Be Harder

By E. C. Neville
Bridge and Building Master, Canadian National, Toronto, Can.

Three coats of paint should be applied to unpainted wood surfaces. The first or priming coat should contain sufficient oil and turpentine to insure the penetration of the paint into the wood and the filling of all of the pores. This coat provides the foundation for the succeeding coats and it should be allowed to dry thoroughly, so that it will be hard before the next coat is applied. The second coat should contain slightly less turpentine and only about one-half as much oil as the priming coat. This coat should be well brushed out and allowed to dry hard before the finishing coat is applied.

The finishing coat should contain more oil than the second coat, so that it will be somewhat softer and will dry with a decided gloss. Care should be exercised, however, to insure that too much oil, in relation to the pigment,, is not used, that the paint is brushed out smooth and even and that the film is not too thick. Otherwise it will sag or run and will remain tacky, so that dust will cling to the surface and spoil its appearance.

If the undercoats are too soft, the finishing coat will usually check or alligator in a short time, creating a poor appearance and at the same time making a poor surface for repainting. In general, when repainting, only two coats are required, for the old paint serves as the priming coat, provided the first coat of the repainting work has sufficient oil and is thinned correctly to satisfy the absorptive requirements of the old paint. The same methods should be followed in applying these two coats as is followed in applying the second and third coats on new work.

A Fundamental Rule

By General Inspector of Buildings

If good results are to be expected from the application of paint, one must observe the fundamental rule that each coat must be somewhat more elastic than that to which it is applied. This is elementary and holds true for both wood and metal surfaces. Applying this rule to a three-coat job, the usual requirement for new surfaces, the priming coat should be the hardest, the second coat should be somewhat more elastic and, therefore, slightly softer, and the finishing should have the greatest elasticity.

It is not difficult to understand the reason for this requirement, for linseed oil does not dry—it hardens by absorbing oxygen from the atmosphere. This is a slow process that continues throughout the life of the paint. Meanwhile, as the process of oxygen absorption continues, the paint is losing its elasticity. Since the finishing coat is in direct contact with the air, it absorbs the oxygen more rapidly than the underlying coats and, therefore, hardens and loses its elasticity more quickly.

Obviously, if first grade materials have been used, the elasticity of any coat will depend on the relative proportions of pigment and vehicle, that

is, linseed oil. In other words, as the ratio of pigment to vehicle increases the hardness of the coat increases and its elasticity decreases. For this reason, the dried priming coat should have the highest content of pigment, the second coat should have less pigment, and the finishing coat the least.

Attention is called to the statement that the *dried* priming coat should have a high pigment content. This should not be interpreted to mean that as the priming coat is mixed for application, it should be high in pigment, for on the contrary, if it is to be applied to a wood surface, it should be rich in oil. The ratio of oil to pigment will vary, depending on whether it is to be applied to wood or metal, and also as between different woods. While metal does not absorb any of the vehicle, all wood is absorbent and robs the paint of some of its oil. For this reason, as the priming film is spread over the surface, as much as 50 per cent, and sometimes considerably more, of the oil penetrates the wood, thus changing the ratio of vehicle to pigment.

This action is not detrimental; on the contrary, it is essential to a satisfactory job. Penetration of the wood by the oil seals the wood surface and satisfies its absorptive requirements so that no oil is drawn from the succeeding coats; it also insures adhesion of the paint film to the wood surface. Experience has shown that this absorption is so essential that it is the universal practice to thin the priming coat with turpentine to assist and insure adequate penetration of the wood by the oil.

Since the turpentine and the drier, which is usually added, are highly volatile, they evaporate quickly and, since so much of the linseed oil is absorbed by the wood, the film of paint left on the surface is high in pigment, about 40 per cent by volume, and should be hard. Although the second coat should be somewhat softer and more elastic than the priming coat, there should not be an abrupt change. For this reason, the pigment content should be high enough to require the addition of considerable turpentine to thin the paint to a brushing consistency. When it has dried, the volume of pigment should be about 37 per cent.

For the finishing coat there should be considerable difference in the ratio of pigment to vehicle; in fact, this ratio should be low enough to eliminate the use of turpentine as a thinner. When dried, the pigment should constitute from 25 to 30 per cent of the volume of the film. This richness in oil is necessary to give the last coat a high gloss. It also provides a margin of safety with respect to elasticity and insurance against cracking as the film hardens under natural conditions.

When it becomes necessary to repaint, it is usually found that the top coat and most of the second coat have vanished through the natural process of chalking, which is nothing more than the failure of the paint through complete oxidation of the vehicle. Unless the painting has been neglected too long, some of the second or body coat and all of the priming coat will be intact. For this reason, the first repainting coat to be applied should perform the same function as the original second coat. Yet, since a weathered surface is porous and should be thoroughly dry, from 1/4 to 1/3 more oil is necessary to satisfy the absorptive requirements of the remaining paint and the wood. To insure that the linseed oil in the new paint will penetrate the old paint satisfactorily, more turpentine should be added, this additional amount being about the same as that of oil. This will give the new body coat about the same composition, when dried, as that of the original body coat, and will provide the same base for the application of the finishing coat.

Standard Tool Equipment

Is there any advantage in developing a standard list of tools for bridge gangs? To what extent should this be made applicable to every gang? Why?

Becoming More Important

By F. H. Cramer
Assistant Bridge Engineer, Chicago, Burlington & Quincy, Chicago

While the tool equipment for bridge and building gangs has always been important, in these days of higher speeds, reduced forces and requirements for a higher standard of work at less cost, this subject is assuming a greater importance than most of us have fully realized as yet. I would not confine the standardization of gang equipment to bridge gangs alone, for the overlapping of bridge and building work and the necessity that sometimes arises for shifting the forces from one class of work to another, makes it desirable to consider the structural forces as a whole, rather than to select gangs that are engaged normally on work of a single class. I would thus include gangs that are organized primarily for structural-steel, timber-bridge, building and concrete work.

Fundamentally, aside from certain tools that are necessary to permit the gangs to function, the purchase of tools should always be based on economic results, including a reduction in the time required to perform an operation, reduction in the number of men necessary to do the work the tool is intended for, less hazard in its performance and, logically, lowered cost. In many cases other considerations, all having an economic basis, enter, such as the possibility of employing cheaper labor, greater accuracy in framing or fitting the component members of the structures, the greater ease with which standards can be followed, better work and reduction in repair costs by reason of interchangeable parts.

In the past, lists of standard tools have been somewhat inflexible. Today, they should be highly flexible. Every gang should have the tools required for its normal assignment. There should, however, be a system allotment of tools that can be transferred to gangs that are assigned temporarily to some other class of work. This will reduce the amount of tools and equipment to be carried, yet will permit a rapid change of plans or schedules if the necessity arises.

Favors Standard List

By District Engineer

No gang can function satisfactorily unless it has the tools necessary to permit it to perform its work quickly and economically, and to the accepted standard. A gang engaged in a certain class of work should, therefore, be assigned a list of tools and equipment for that work and should be required to have them available at all times. It is the function of supervision to see that this requirement is fulfilled.

On the other hand, the work of many gangs engaged in the maintenance of bridges and buildings overlaps. For instance, although special concrete gangs may be organized for the construction or maintenance of masonry culverts, a gang engaged in timber-trestle work may need concrete piers to support framed bents,

or may be assigned to replace a failing bridge seat under a girder span; while a building gang may need to build a concrete foundation or a concrete curb for a platform, at a time when the concrete gang is tied up on an important job.

Obviously, if concrete work is merely incidental to the normal assignments of these gangs or such work is required of them only occasionally, it would not be reasonable to equip them fully for concrete work. Yet, when they need equipment they need it badly, for which reason there should be a system or regional reserve that can be transferred as occasion arises, to supplement the normal standard list and reduce the amount of idle equipment.

Because bridge and building work covers a wide range of operations, an inflexible list of tools and equipment to be assigned to all gangs is not advisable. A gang engaged in the maintenance of steel bridges requires many tools differing from those required by a gang that is maintaining timber trestles, although there will be tools common to both. Again, the requirements for building gangs and concrete gangs differ widely, not only between each other but also from those of the two classes of bridge gangs. Yet, again, certain tools will be common to all of them, although not the same number of each will be required. A concrete gang will need more shovels than a structural-steel gang; and only a structural-steel gang will require rivet busters and riveting hammers. An air compressor or an electric generator may be needed equally by all four of the gangs mentioned.

These facts indicate the manner in which the standard lists should be made up. Every gang should be considered on its merits, and the standard list should be made for the group of gangs engaged in similar work; every gang in this group should be required to keep on hand the number and kinds of tools called for by the list. In addition, because of the variations in local conditions, some of the gangs will require certain tools or equipment that are not needed by other gangs in the same group. These, then, should be added to the list for the particular gangs and a record kept by the foreman, the supervisor and the bridge engineer, the latter provided he exercises close supervision over this phase of the operation of the gangs engaged in such work.

Timber for Crossing Plank

What are the best species of timber for highway crossing plank? Should they be given preservative treatment? Why?

Prefers Red Gum

By F. B. Lafleur
Roadmaster, Southern Pacific, Lafayette, La.

It is my experience that red gum is the best timber for crossing plank, because of its extreme hardness. Where crossing planks are installed with steel cover plates or other protection against abrasion, any good quality of timber may be used with equal advantage. It is obvious that any species of timber for crossing service should be given preservative treatment to prolong its life and thus avoid the cost of frequent renewals.

I have a highway crossing on the old Spanish trail in which 3-in. by 12-in. treated red gum was installed during November, 1930. It was constructed without cover plates or other protective material, except a thin coat of hot asphalt. These planks are still in reasonably good condition after more than eight years service, despite a density of traffic amounting to 46,000 vehicles in seven days, as counted by a traffic recorder. On this basis more than 19,000,000 vehicles have passed over this crossing during the eight years it has been in service. It is of special interest that none of the planks have been renewed, an indication that creosoted red gum stands well toward the top of the list of woods that are suitable for crossings.

Urges Treatment

By H. E. Herrington
Section Foreman, Minneapolis & St. Louis, Jordan, Minn.

While untreated crossing planks are still used widely, they are much less durable than treated plank. The increasing cost of lumber has necessitated measures for increasing its durability. Short life means frequent renewals, which involve labor as well as material costs. By extending the life of the timber, both of these costs are reduced and preservative treatment is the best means so far discovered for doing this. Timber for crossing plank should be dense and have well-knit fibres to resist abrasion and the tendency to splinter, both of which are characteristic of many of the soft woods. Any wood that meets these requirements should be satisfactory for crossing plank. It should be given preservative treatment, for not a few woods that are otherwise satisfactory have little resistance to decay.

Is Using Black Gum

By District Engineer

After having used other species, principally untreated pine, for planking road crossings, it was decided in 1926 to use creosoted black gum extensively for this purpose. Black gum checks less than most other woods, while it takes treatment readily in both the heartwood and sapwood. When fastened down securely, it shows little tendency to warp.

Black gum, properly installed, forms a crossing surface that is smooth and that stands up better than other woods under movement and replacement when necessity for track adjustments occurs. This latter characteristic has a large part in determining the life that is obtained from the gum. Planks 4 in. by 8 in. and 4 in. by 10 in., 8 and 16 ft. long are generally used, the end pieces being beveled to reduce the hazard of catching dragging equipment. The ties under the crossing are spaced to give support to the ends of all planks, if necessary.

The timbers are milled to size, including the furring strips, before treatment. They are treated to a retention of 8 lb. of a 50-50 creosote-petroleum mixture. Many of the installations made in 1926 remain in place today, and are still rendering satisfactory service. While the actual life that may be expected has not been fully determined, the results to date have been satisfactory.

The use of lag screws for fastening the planks in place has an important bearing on their serviceability. It is our practice, when installing or renewing one of these crossings, to renew all of the crossties within the limits of the crossing with new sawed ties and to tamp the track thoroughly and line it before the planks are put down. If subgrade drainage is required, it also receives attention at this time, if practicable, to avoid the necessity of disturbing the crossing for as long a time as possible.

At the more complicated crossings, where special framing is necessary by reason of turnouts, layout plans are prepared and all timber is milled to fit before it is treated. In making the installation, the planks are brought to the proper elevation for the various weights of rail by means of creosoted furring strips of the proper thickness. These strips are fastened with either lag screws or boat spikes, the former being preferred.

While rubber tires, which now predominate, are less exacting on the crossing surface than steel tires, which were more common only a few years ago, in that they cause less splintering, abrasion and other mechanical damage, it is quite obvious that black gum is more resistant to wear than untreated pine and similar softwoods that have been and are still in common use. Sufficient data have already been accumulated to indicate that the additional life obtained from treatment with creosote to prevent decay more than justifies the cost of the treatment.

Black Gum Is Best

By W. A. Summerhays
Manager Forest Products Bureau, Illinois Central, Memphis, Tenn.

Recently, various substances and patented devices have come onto the market as substitutes for highway crossing plank, and this has led to inquiry into the use of various woods for this purpose. Untreated white oak has been used generally by a number of railways and has proved to be cheap, durable and readily available. More recently, however, the supply of this timber has become scarce, with the result that red oak has been used or the crossing planks have been cut from young white oak trees, and these have a relatively short life.

In considering other woods for this purpose it has been found necessary to resort to preservatives to overcome early decay. Where vehicular traffic is light, as at farm crossings, creosoted yellow pine makes an excellent material which has the advantages of low cost and long life. Where traffic is heavy, the best records for low cost and long life have been made by black gum that has been pressure-treated to a retention of 6 lb. with straight creosote.

Black gum requires careful preparation to avoid warping or undue checking during the seasoning period, and should be treated as soon as the proper moisture content is reached. The planks should be laid even with the top of the rail and secured firmly to a creosoted foundation that will not decay before the planks are worn out. A highway crossing of this type, so secured that it will remain solid under heavy road traffic will outlast two or three crossings constructed of the untreated white oak now available.

Ditching After Snow Plows

Where snow plows are operated, does the probability of sudden thaws warrant the opening of the ditches after each storm? Why?

Not Necessary

By J. B. Kelly
General Roadmaster, Minneapolis, St. Paul & Sault Ste. Marie, Stevens Point, Wis.

In the North Central states, winter thaws do not require the opening of ditches after each snowstorm to prevent flooding that might interfere with the track or with the operation of trains. Almost without exception the water resulting from thaws finds its way down through the snow into the permanent ditches and through them under the snow. Being under the snow, this water is protected from freezing when the temperature falls and is given opportunity to drain away. The unmelted snow will hold considerable water and give it up slowly, so that as soon as the temperature falls below freezing, the flow is diminished and there is no overflow and no blocking of the channel by accumulations of ice.

However, precautions must be exercised during the period when it is thawing to insure that there are no obstructions that might interfere with the flow of the water from the melting snow. This merely calls for a small amount of trenching along the snow border and at the lower ends of the cuts to insure quick runoff of exposed water.

This system is similar to that employed in disposing of the winter flow of water from spring cuts. The track forces soon learn the best method of doing this. They follow the plan of raising the water level slightly above normal at the time of the first freeze and after a firm film of ice has formed the water level is dropped and the flow continues under the layer of ice thus formed, in all temperatures throughout the winter.

In proof of the value of housed-in drainage, some instances are recalled where trespassers interfered with the system that has been described, by cutting openings in the roof ice and blocking the channels temporarily. This caused the water to freeze solid to the bottom of the ditches, after which very little could be done to avoid an overflow that raised the ice level and directed the water toward the track. As a result, it was necessary to maintain a large force, day and night, to keep the track passable.

As a rule, even heavy spring thaws are handled by the normal winter forces. At this time, however, efforts are concentrated on trenching to hasten drainage, thus effecting early benefit to the ballast and roadbed.

Not Good Practice

By Division Engineer

Where the snowfall is heavy enough to necessitate the operation of snow plows, with one exception, the opening of the ditches is not only unnecessary but may be positively dangerous. Frost does not penetrate deeply into snow and, unless an exceptional thaw occurs, the water from the melting snow will gravitate to the ditches and flow under the snow, eventually forming a covered channel to the normal outlet.

If trenches are constructed, the water is exposed to freezing if the temperature drops, and an ice barrier will be formed that will obstruct the flow. Furthermore, even if trenches are constructed, drifting or later operation of the flanger or spreader will again fill them up and if an ice barrier has been formed, conditions will be worse than if the trenches had not been cut. In many situations the maintenance of ditches can be accomplished only at unreasonable cost.

If the side ditches and incidental drainage are properly prepared for winter during the late fall, that is, if all ditches, culverts and other waterways are cleaned out and graded to prevent pockets in which water can stand, there should be little trouble in disposing of the water from the normal thaws that occur during the winter.

An exception was noted at the beginning of this discussion. This referred to the period late in the sea-

son when the severity of the weather begins to relax shortly before spring. At this time all outlets should be opened and in many places it will be advisable to do considerable trenching through the accumulated snow, particularly near the ends of cuts and at culverts. It is always desirable to dispose of water as quickly as possible, but this is doubly important during the spring thaws after heavy accumulation of snow. At this time the frost is leaving the ground and water standing on or near the roadbed will have a detrimental effect when track conditions are at their worst.

Grade Line in Sewers

Should the grade line in sewers at engine terminals be continuous through manholes or should it be broken by a drop to catch sediment and other refuse? Why?

Depends on Purpose

By Frank R. Judd
Engineer of Buildings, Illinois Central, Chicago

Sewer systems in engine terminals usually have to care for two distinctive conditions, one being the handling of sanitary sewage and the other being the disposal of storm water and other forms of drainage. Sanitary sewers must have a continuous grade line, unbroken by drops. Storm water sewers generally have drops or catch basins to collect sediment and other refuse, although they are not essential if the system is properly designed to function without them.

It is common practice to provide drops or catch basins at or near the inlets of all storm sewers, to collect the sediment and prevent it from entering the main drainage lines. Where this is done, the main lines are constructed with continuous grades and manholes are provided only for rodding purposes. The use of drops or catch basins in this manner is usually required by municipal law to prevent obstruction of the public sewers.

When storm sewers are built without drops or catch basins, they must be so designed that they will run full and have sufficient pressure to keep them clean, or be of such size that an accumulation of sediment will not readily obstruct them. Sewers constructed in this manner must be flushed out periodically under high pressure to keep them from becoming filled or stopped up. This can be done where the sewers discharge into streams or into city mains where no restrictions prevail.

The use of drops for collecting sediment in storm sewers is considered the best practice and is the most common method. However, I recall an instance in a large city in one of the central states where the storm-sewer system has no drops or catch basins for intercepting sediment and other refuse. In this case the minimum size of the sewer is 15 in. The city also possesses a high-pressure water system that is essential for flushing the sewers at regular intervals.

Serve Many Facilities

By W. C. Harman
Bridge and Building Supervisor, Southern Pacific, San Francisco, Cal.

Sewers at engine terminals must be designed to serve many facilities, including engine pits, both inside and out of enginehouses, water and fuel-oil columns; garages, washrooms, roof drainage, and often the general drainage of ground surrounding these facilities. Each one of these facilities originates all sorts of litter, such as wiping waste, oily waste, boiler scale, sand, wood splinters, paper, rags, oil gobs, grease and other sediment, trash and refuse, some of which will float and some of which deposits quickly after entering the drainage system. That which floats may combine easily with the heavy solids to form an obstruction to the flow through the sewer, and eventually cause a stoppage. For this reason it is highly desirable that they be removed as quickly as possible after they enter the line.

Our terminal sewers run through a separating pit, placed at some convenient point where the oil and grease are trapped and recovered before the water passes into the storm sewer. This pit is usually so placed that the sewer will have few, if any, ells or bends in its course to the separator. This eliminates all, or most, of the natural obstacles to the flow that tend to retard the movement of the solid matter and give it a chance to build up or start a plug. It is necessary, however, to introduce manholes at intervals to permit inspection and cleaning.

One of these manholes should be located a short distance from the last of the engine pits and others at the junctions of the several lines. Each manhole should be so constructed that the bottom will be below the grade line of the sewer to insure that all possible solids, such as sand and scale, will be deposited in the drop instead of being carried farther along in the line, or possibly to the separator pit. It is my experience that these traps have saved many a costly plug in the lines.

Shovels for Flanging Track

What is the best design of shovel for flanging track, with respect to width of blade and length of handle?

Uses Standard Snow Shovel

By H. F. Fifield
Engineer Maintenance of Way, Boston & Maine, Boston, Mass.

We use our standard snow shovel for flanging track, as we do not consider it economical to use a special shovel for this purpose. This shovel has a blade 11¼ in. wide over all, with a ½ in. roll at each side, and is 14 in. long. The handle is 36 in. long and has a lift of 24 in., so that a man of average size can use it with the minimum of stooping. The wood grip is set in a metal D-frame or grip holder 7 in. long. The shovel blade is of 16-gage, carbon heat-treated steel and the handle is of clear second-growth ash. The shovel weighs 5¼ lb.

Prefers No. 2 Shovels

By District Engineer

I am in favor of keeping the number of designs of hand tools to the lowest reasonable minimum. For this reason, I do not favor having a specially designed shovel for flanging track, particularly as such a tool is seasonal and of little use except for the purpose for which it is designed. Thus the investment in these shovels

is non-productive for most of the year, besides which every maintenance officer knows that tools that are seldom used are easily lost. Furthermore, while on the whole, considerable hand flanging is necessary at points where the flanger blades must be raised to clear obstructions, as at turnouts, grade crossings, etc., this represents only a small part of the total work involved in fighting snow and of cleaning up after the storm is over. To have a special tool for this purpose adds to the equipment that must be carried about and looked after by the gang at a time when attention is centered on doing a quick job, often where hazards are involved.

It is my experience that, in general, the flanging of track can be done as effectively with a No. 2 track shovel as with a special tool, so that no special advantage results from the purchase of shovels of special design. In many cases, where considerable shoveling of loose snow is necessary, I find that the men prefer to use scoops, which are generally at hand during the storm and until the work of clearing up is completed. Another point where considerable flanging is usually necessary, is around engine terminals where, as a practical matter, snow plows and flangers cannot be operated. Here also, most gangs find the scoop a most useful tool.

Obstructions in Water Lines

What is the best method of locating and determining the extent of obstructions in water-delivery lines?

Tap the Line

By R. C. Bardwell
Superintendent Water Supply, Chesapeake & Ohio, Richmond, Va.

If this question refers to scale deposits or general corrosion, the best means is to cut the line and measure the amount of incrustation. If the obstruction is caused by the wedging of some foreign material in the line at some definite point, which restricts the clearance, and if this place in the water line is so situated that the stoppage cannot be located by means of a Sonoscope or similar listening device that is used for leak detection, the most practical method is to tap the pipe and apply pressure gages on both sides of the obstruction and continue to make such taps at suitable approach intervals until the pressure readings and the distance between gages indicate the location.

Two Kinds

By Water Service Inspector

Obstructions in water-discharge lines fall into two classes: (1) foreign bodies, loose valve gates, and other similar materials; and (2) tuberculation, incrustation or sedimentation, that is, mud or deposits such as sometimes occur at water-softening plants. The presence of obstructions of either type is generally indicated by a decrease in the flow through the pipe or by the necessity for increasing the pump pressure to maintain the normal flow. If the water is flowing by gravity, the delivery will decrease; if it is a pressure line the pumping pressure must be raised to maintain the desired delivery.

If the presence of an obstruction is indicated in either of these ways, the actual carrying capacity of the line should be determined and compared with that of a new line operating under identical conditions. If the obstruction is continuous—that is, if it results from deposits or coatings in the pipe—its existence will generally be known or suspected by reason of the character of the water or the nature of the treatment, and through inspections that may be made during the progress of repairs. Such deposits can be removed only by the usual method of pipe cleaning. If it develops that the trouble is caused by heavy incrustation, it may be necessary to lay a new line and abandon the existing one.

If the obstruction is local, the loss in pressure will not be uniform, but will be concentrated at the obstruction. In searching for such an obstruction it is desirable to increase the flow through the line as much above normal as is practicable, as this will increase the loss in pressure and make it easier to find the location of the obstruction. Valves should be tested first of all; to make certain that the trouble has not been caused by a broken stem or lug, thus permitting the gate to drop. Sharp bends should be investigated as any large body is likely to become lodged at such points.

If a profile of the line is available it becomes a simple matter to locate the obstruction by means of the hydraulic gradient. By taking the pressure at a number of points and plotting these on the profile, drawing a line from point to point, one will obtain the hydraulic grade line for the delivery at the time the readings are taken. This line merely represents the height to which the water would rise at the points where the readings were obtained under the conditions of flow at the time of the observations.

If the pipe is uniform in size and the pressure constant, as it should be in a free and unobstructed pipe, the hydraulic gradient will be a straight line from the point where the pump is located to the point of delivery. If the gradient as observed is broken and shows a distinct loss of head, as indicated by a sharp dip in the grade line, this section should be subdivided until the obstruction is located. When this is done the pipe can be cut and the obstruction removed.

Local obstructions can sometimes be located by means of an aquaphone or similar device, for when water is forced around an obstruction considerable turbulence is created, causing a distinctive noise that can be detected with a listening device. If the delivery line is short, the obstruction can sometimes be located by floating a bag of sawdust attached to a line, through the pipe. When the bag is stopped by the obstruction, the length of the line paid out will locate the obstruction. Methods of locating obstructions by measuring the volume or velocity of flow are sometimes employed. These are reasonably dependable if there is no leakage in the line, but may not be dependable if considerable leakage exists.

Redwood Telegraph Poles on Southern Pacific at Calistoga, Cal., Perforated by Woodpeckers for the Storing of Acorns

NEWS of the Month

Southeastern Coach Rate Reduced to 1½ Cents

Effective January 15, the basic coach fare on railroads in the Southeast was reduced from two cents to one and one-half cents per mile. The one and one-half cent fare had previously been in effect for some time prior to November 1, 1937, at which time it was increased to two cents.

Famous Train Makes Sea Voyage

The Coronation Scot, famed streamlined express flyer of the London, Midland & Scottish (Great Britain), left England on January 23, en route to the United States. The train will make a 3,000-mile tour in this country, in which 38 cities will be visited, and later it will be exhibited at the New York World's Fair.

Amlie Appointed by Roosevelt

Thomas R. Amlie, a Wisconsin Progressive and a former member of the House of Representatives, has been appointed by President Roosevelt to be a member of the Interstate Commerce Commission for a term expiring December 31, 1945. Mr. Amlie's appointment is subject to confirmation by the Senate. He will succeed Balthasar H. Meyer, who has been a commissioner since January, 1911.

Milwaukee Places Morning "Hiawathas" in Service

On January 21, the Chicago, Milwaukee, St. Paul & Pacific added two streamlined "Hiawathas" to its service between Chicago and the Twin Cities. Both trains depart from their respective terminals in the morning. The Chicago-bound train from St. Paul operates on the same 6½ hr. schedule as the older evening "Hiawathas," while the train leaving Chicago in the morning operates on a slightly slower schedule.

Washington Terminal Fights Adjustment Board Decision

The Washington Terminal Company, owner of the Washington (D.C.) Union Passenger Station, has filed suit in the United States District Court of Columbia, challenging the demand of the Brotherhood of Locomotive Firemen and Enginemen and the Brotherhood of Railroad Trainmen that the Terminal be required to employ special additional switch crews to back trains of empty cars from the passenger station to the storage yard. This is believed to be the first court test of the National Railroad Adjustment Board's power in a case of this character.

Canadian National to Complete Terminal

The Canadian National is resuming work on its terminal at Montreal, Que. It is estimated that this project, which was begun in 1930 and discontinued in 1932 after an expenditure of $15,000,000, will cost an additional $12,600,000 for completion.

8,000 HP. Electric Locomotive Built in Germany

An experimental electric locomotive rated at 8,000 hp. was recently built in Germany and delivered to the German State Railways. It is designed to attain a maximum speed of 112 m.p.h. within 4½ minutes or within a distance of 5½ miles when hauling 8 lightweight passenger cars weighing 360 tons. Braking specifications require that the train shall be brought to a stop from a speed of 112 m.p.h. in a distance of 2,950 ft.

Lea Introduces Transportation Bill

Representative Clarence F. Lea of California, chairman of the House of Representatives committee on interstate and foreign commerce, introduced on January 13, a proposed "Transportation Act of 1939." The bill which is expected to form the basis of broad-gage legislation after numerous hearings and discussions before the House committee, is designed according to Mr. Lea, "to preserve each type of transportation in giving the country the benefit of its economic advantages and to protect it in the performance of those functions." The bill covers some matters recommended by the President's recent railroad committee-of-six, and others recommended by the Splawn-Eastman-Mahaffie committee. It sets forth a national transportation policy; provides for a reorganized Interstate Commerce Commission of 19 members functioning through three divisions; creates within the commission's staff the office of Transportation Administrator with "co-ordinator" duties similar to those proposed for the three-man transportation board recommended by the committee-of-six; brings certain water carriers under I.C.C. regulation; and gives the I.C.C. power over minimum rates of all types of interstate transportation, such power to prevail over that of any other federal agency. Also, the bill would provide for a special railroad reorganization court; repeal the consolidation plan to give the railroads more initiative in connection with mergers; liberalize Reconstruction Finance Corporation lending powers; and repeal land grant rates. There is no change in the rule of rate-making, or provision for repeal of the long-and-short-haul clause, both recommended by the committee-of-six.

Trucks and Railroads Recommend Equal Rates

Representatives of trucking companies and railroads operating in Pennsylvania, at a meeting with the Public Utility Commission in Harrisburg, Pa., on January 24, adopted a resolution "that there should be uniformity of rates for truck or rail transportation, and uniformity of rates is understood to mean the payment by the shipper or consignee of the same aggregate charge for a given service by highway or rail transportation."

Two Streamliners Cover More Than 500,000 Miles in Year

The streamliners, City of Los Angeles and City of San Francisco, travelled a total of 547,200 miles during their first year of operation, on a schedule of five trips per month between Chicago and Los Angeles and between Chicago and San Francisco, respectively. The City of Los Angeles is operated jointly by the Union Pacific and the Chicago & North Western, while the City of San Francisco is operated jointly by these two roads and the Southern Pacific.

Rutland Wage Reductions Before Mediation Board

The services of the National Mediation Board have been invoked by the Rutland and all labor organizations over the decision by L. G. Morphy, receiver, to reduce wages on a sliding scale approximately 17 per cent, effective January 12. The pay reduction would be on the same scale as the wages withheld by federal court order effective August 1, 1938, which was announced in the September issue of *Railway Engineering and Maintenance*. The court order was issued to enable the Rutland, which is in severe financial difficulties, to continue operation, and the present deduction is sought on the same basis.

Personal Mention

General

Thomas L. Doyle, division engineer of the Columbus division of the Pennsylvania, has been promoted to assistant to the general manager of the Western Region, at Chicago.

L. E. Grant, chief chemist and metallurgist of the Chicago, Milwaukee, St. Paul & Pacific, has been appointed metallurgist and welding engineer, serving all departments.

J. H. Forbes, whose promotion to right of way and lease agent of the Canadian Pacific, with headquarters at Montreal, Que., was announced in the January issue, entered the service of the C.P.R. in 1908, and was engaged in various capacities at different points until the outbreak of the World war. After serving overseas, Mr. Forbes returned to the C.P.R. in 1919, as resident engineer at Smiths Falls, Ont. Three years later, he was advanced to division engineer in charge of the Montreal Terminals, being appointed assistant district engineer of the Quebec district, with headquarters at Montreal in 1929. In October, 1938, Mr. Forbes was promoted to assistant right-of-way agent, holding this position until his recent appointment.

S. W. Fairweather, director of the bureau of economics of the Canadian National, with headquarters at Montreal, Que., and an engineer by training and experience, has been appointed chief of research and development, with the same headquarters. Mr. Fairweather was graduated from McGill University where he studied engineering, and became connected with the Department of Railways and Canals in May, 1916, as assistant engineer on the car ferry terminals at Borden, Prince Edward Island. The following year he became assistant engineer on the

S. W. Fairweather

Quebec bridge and later was structural engineer and office engineer of the Department at Ottawa. Mr. Fairweather entered the service of the Canadian National in 1923 and served in the department of economics, of which he became assistant director in 1929. The following year he became director of the Bureau of Economics, the position he held until his recent appointment as chief of research and development.

Albert Shaw, general superintendent of Lehigh & Hudson River and an engineer by training and experience, has been appointed vice-president and general manager, with headquarters as before at Warwick, N. Y. Mr. Shaw was born on June 12, 1884, at Williamsport, Pa., and entered railway service with the New York Central on March 20, 1904, serving as rodman at Corning, N. Y. He left the New York Central for a similar position on the Reading in March, 1905, and the following year was appointed assistant supervisor at Tamaqua, Pa. He was later appointed assistant supervisor of the New York division and also served in the same capacity at Lansdale, Pa. Mr. Shaw was promoted to supervisor in January, 1912, and in July, 1920, became assistant trainmaster, being appointed joint assistant trainmaster at Newberry Junction, Pa.,

Albert Shaw

a short time later. In May, 1926, Mr. Shaw left the Reading to become superintendent of the Lehigh & Hudson River, becoming general superintendent in December, 1928, the position he held until his appointment as vice-president and general manager, effective January 1.

Frank Taylor, whose retirement on December 31, as right-of-way and tax agent of the Canadian Pacific, with headquarters at Montreal, Que., was announced in the January issue, entered the service of the C.P.R. in 1889 as a rodman in the division engineer's office at Montreal. He was advanced to draftsman in 1893, to assistant engineer in 1899 and to resident engineer in 1902. Three years later he became an assistant engineer in the chief engineer's office at Montreal, and in 1908 he was promoted to division engineer at North Bay, Ont. Four years later, Mr. Taylor returned to Montreal as division engineer, becoming right-of-way and lease agent at that point in the same year and right-of-way and tax agent in 1916.

Walter H. Edwards, general superintendent of the Lehigh & New England, and an engineer by training and experience, has been elected vice-president and general manager, with headquarters as before at Bethlehem, Pa. Mr. Edwards was born on January 29, 1890, at Wil-

Walter H. Edwards

mington, Del., and was graduated in civil engineering from Bucknell University in 1913. He entered railway service in August, 1909, in the construction department of the Baltimore & Ohio, where he remained until September, 1910, when he left temporarily to complete his engineering education. He returned to the B. & O. in September, 1913, as an assistant on the engineering corps. In March, 1915, he became a draftsman in the architect's office at Baltimore, Md. From June, 1915, until May, 1916, he was employed in the Bureau of Valuation of the Interstate Commerce Commission in connection with the federal valuation of railroads, being asigned to roadway field inventory duties. In May, 1916, he returned to the Baltimore & Ohio as office draftsman in the valuation department, and on March 16, 1926, he was appointed cost engineer. Mr. Edwards left the service of the Baltimore & Ohio on December 1, 1930, to become general superintendent of the Lehigh & New England.

Engineering

E. L. Mire, assistant chief engineer of the New Orleans Public Belt, with headquarters at New Orleans, La., has been promoted to chief engineer.

O. K. Peck, bridge engineer of the Denver & Rio Grande Western, has been appointed engineer of structures, a change of title, with headquarters as before at Denver, Colo.

P. O. Ferris, acting engineer maintenance of way of the Delaware & Hudson, with headquarters at Albany, N. Y., has been appointed engineer maintenance of way, effective February 1.

W. B. Wood, chief engineer of the Central region of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been transferred to the Eastern region, with headquarters at Philadelphia, Pa., succeeding **E. B. Temple,** who has been granted a leave of absence, and **C. I. Leiper,** general manager of the Central region, has been appointed chief engineer

of that region relieving Mr. Wood.

G. M. Hain, supervisor of track on the Philadelphia Terminal division of the Pennsylvania, has been promoted to division engineer of the Toledo division, with headquarters at Toledo, Ohio, relieving **G. H. Schlotterer,** who has been assigned to other duties.

Robert B. Jones, assistant engineer of track on the Canadian Pacific, has been promoted to engineer of track with headquarters as before at Montreal, Que. **R. Mudge** has been appointed assistant engineer of track, with headquarters at Montreal, to succeed Mr. Jones.

W. F. Miller, formerly engineer maintenance of way of the Eastern Pennsylvania division of the Pennsylvania, with headquarters at Harrisburg, Pa., has been appointed assistant to the chief engineer maintenance of way of the Eastern region, with headquarters at Philadelphia, Pa. **S. R. Hursh,** acting engineer maintenance of way at Harrisburg, has been appointed engineer maintenance of way, with the same headquarters, succeeding Mr. Miller.

J. B. Jones, supervisor of track on the New York division of the Pennsylvania, has been promoted to division engineer of the St. Louis division, with headquarters at Terre Haute, Ind., succeeding **James L. Cranwell,** who has been transferred to the Columbus division, with headquarters at Columbus, Ohio. Mr. Cranwell replaces **Thomas L. Doyle,** whose promotion to assistant to the general manager of the Western region at Chicago is announced elsewhere in these columns.

G. W. Miller, roadmaster of the Boundary subdivision, Nelson division, British Columbia district of the Canadian Pacific, with headquarters at Grand Forks, B. C., has been promoted to division engineer of the Revelstoke division, with headquarters at Revelstoke, B. C., replacing **G. B. Alexander,** who has been transferred to the Kootenay division, with headquarters at Nelson, B. C., relieving **H. R. Younger,** whose promotion to superintendent of the Kettle Valley division was announced in the January issue.

H. J. Seyton, district engineer of Lines East on the Great Northern, with headquarters at Duluth, Minn., has been promoted to assistant chief engineer, Lines West, with headquarters at Seattle, Wash., succeeding **Colonel Frederick Mears,** whose death on January 11, is announced elsewhere in this issue. **E. E. Adams,** district engineer, Lines West, with headquarters at Seattle, has been transferred to Duluth to succeed Mr. Seyton, and **F. E. Wiesner** has been appointed office engineer in the office of the assistant chief engineer at Seattle. The position of district engineer, Lines West, with headquarters at Seattle, has been abolished.

Arthur F. White, who has been appointed engineer of the Toronto, Hamilton & Buffalo, with headquarters at Hamilton, Ont., as reported in the January issue, was born on May 7, 1889, at St. Thomas, Ont., and entered railway service on December 6, 1906, as a chainman on the Michigan Central at St. Thomas. Subsequently, Mr. White served as a draftsman and instrumentman with this company. On January 24, 1913, he entered the service of the T. H. & B. as chief transitman at Hamilton. On July 1, 1927, he was advanced to assistant engineer and on January 1, 1933, he became an inspector, being reappointed to the position of transitman on August 1, 1933. Five years later, Mr. White was appointed acting supervisor of signals, which position he held until his recent appointment as engineer.

Frederick P. Sisson, office engineer of the Grand Trunk Western, with headquarters at Detroit, Mich., has been promoted to chief engineer, with the same headquarters, succeeding **P. D. Fitzpatrick,** whose promotion to general manager was announced in the January issue. Mr. Sisson was born at Battle Creek, Mich., on January 16, 1880, and entered railway service on January 8, 1900, as a clerk in the engineering department of the Grand Trunk at Detroit. He advanced through the successive positions of draftsman, surveyor, assistant engineer, resident engineer and division engineer at that point and on March 1, 1921, was appointed division engineer at Chicago, afterwards returning to Detroit in the same capacity. On April 16, 1929, Mr. Sisson was promoted to principal assistant engineer and on September 1, 1932, he was appointed office engineer at Detroit.

Frederick P. Sisson

John E. Armstrong, whose promotion to chief engineer of the Canadian Pacific, with headquarters at Montreal, Que., was announced in the January issue, was born at Peoria, Ill., on September 29, 1886, and was educated at Bradley Polytechnic Institute, Peoria, and Cornell University, Ithaca, N. Y., where he was graduated in civil engineering in 1908. He first entered railway service in 1901 with the Toledo, Peoria & Western at Peoria, where he served in various capacities during summer vacations until 1908. From August, 1908, to August, 1912, he served as an assistant on the engineer corps of the Pennsylvania, Lines West of Pittsburgh, and at the end of this period he became an assistant engineer on the Canadian Pacific at Montreal. He served in this position until May 1, 1928, when he was appointed assistant chief engineer. For many years, Mr. Armstrong has been active in the affairs of the American Railway Engineering Association, and, after service as a director and as chairman of the Committee on Yards and Terminals, he served as president during 1934-5.

John E. Armstrong

J. M. R. Fairbairn, whose retirement as chief engineer of the Canadian Pacific, with headquarters at Montreal, Que., was announced in the January issue, was born on June 30, 1873, at Peterborough, Ont., and attended the School of Practical Science, Toronto, Ont., graduating in 1893. During the early years of his engineering career, Mr. Fairbairn was engaged in various capacities with different governmental agencies in Canada. From 1898 to 1900, he was engaged in private practice and later served as civil and mining engineer and provincial land surveyor at Kalso, B. C. He first entered the service of the C. P. R. in April, 1900, but after about five months with this company, during which period he served as a levelman in the construction department, he became an engineer in the Department of Railways and Canals of the Canadian government. In 1901 he returned to the C. P. R. as an assistant engineer in the division engineer's office at Montreal, then becoming resident engineer at Ottawa, Ont. In 1904 he became an assistant engineer in the chief engineer's office at Mon-

J. M. R. Fairbairn

treal, being appointed acting division engineer of the old Eastern division (now the Quebec district) in 1905. In the following year, he was appointed division engineer at Toronto and in 1907 he was transferred to Montreal. From 1908 to 1910, Mr. Fairbairn served as principal assistant engineer in the chief engineer's office, then becoming engineer maintenance of way. In 1911, he was further promoted to assistant chief engineer. He has been chief engineer of the system since 1918. Mr. Fairbairn was president of the American Railway Engineering Association in 1925 and 1926.

Track

L. P. Larkey has been appointed track supervisor on the Louisville & Nashville, with headquarters at Hazard, Ky., replacing **J. O. Stephens**, who retired on January 1.

H. F. Elliott has been appointed roadmaster on the Salt Lake division of the Southern Pacific, with headquarters at Ogden, Utah, succeeding **C. C. Clark**, who has retired.

A. J. Marshall, section foreman on the Canadian National at Belmont, Man., and relief roadmaster at various times, has been appointed acting roadmaster, with headquarters at Brandon, Man., succeeding **F. Scott**, who has retired.

R. C. Bishop, assistant cost engineer on the Huntington division of the Chesapeake & Ohio, has been appointed assistant supervisor of track, with headquarters at Walbridge, Ohio, effective January 15.

V. E. Pearson has been promoted to acting roadmaster on the Southern Pacific, with headquarters at Oakland Pier, Cal., replacing **O. M. Barlow**, whose promotion to acting assistant division engineer at that point is noted elsewhere in these columns.

H. Whyte, section foreman on the Canadian National at Lynden, Ont., has been promoted to roadmaster, with headquarters at Hornepayne, Ont., replacing **J. F. Sinclair**, who has been transferred to Stratford, Ont., relieving **C. H. Muma**, who has retired.

J. W. Carnohan, junior engineer in the division engineer's office on the New York Central at Cleveland, Ohio, has been appointed assistant supervisor of track, with headquarters at Sandusky, Ohio, succeeding **Robert Sabiers**, who has retired on pension.

L. E. Peterson, assistant division engineer of the San Joaquin division of the Southern Pacific, with headquarters at Bakersfield, Cal., has been promoted to division engineer of that division replacing **William Riseden**, who has been appointed assistant division engineer, with the same headquarters.

C. K. Holden, roadmaster of the Portage division, Manitoba district, of the Canadian Pacific, with headquarters at Winnipeg, Man., has been transferred to the Kenora division, with the same headquarters, succeeding **T. W. Creighton**, who has been transferred to Grand Forks, B. C., relieving **G. W. Miller**, whose promotion to division engineer is noted elsewhere in these columns.

A. F. Harrington, section foreman on the Canadian Pacific at Woodbridge, Ont., has been promoted to roadmaster, with headquarters at Guelph, Ont., succeeding **M. E. Morgan**, who has been transferred to London, Ont., with jurisdiction over the Galt subdivision, replacing **K. O. Shepard**. Mr. Shepard has been given jurisdiction over the Windsor subdivision, with headquarters as before, at London, relieving **A. E. Partushek**, who has been transferred to Sudbury, Ont.

Olaf Erickson, whose promotion to roadmaster on the Canadian Pacific, with headquarters at Manyberries, Alta., was announced in the November issue, was born in Sweden on January 14, 1887, and entered railway service on April 15, 1904, as a sectionman on the Canadian Pacific at Dalton, Ont. On December 25, 1905, he was promoted to section foreman and subsequently served as section foreman, assistant extra gang foreman, extra gang foreman, and yard foreman at various points on the Schrieber, Taber and Crows Nest subdivisions. Mr. Erickson was advanced to acting roadmaster on December 21, 1937, and was serving as relieving roadmaster with headquarters at Macleod, Alta., at the time of his recent promotion.

Ole Totland, whose promotion to roadmaster on the Canadian Pacific, with headquarters at Lanigan, Sask., was reported in the November issue, was born in Norway on August 23, 1890, and entered railway service in May, 1908, as a section man on the Kenora division of the Canadian Pacific. In November, 1910, he was promoted to section foreman at Luseland, Sask., and in May, 1912, he was advanced to section foreman in charge of the Kerrobert Yard. He resigned in 1918 to engage in farming, but returned to railway service in August, 1924, as an extra gang foreman on construction work. He again became a section foreman on April 19, 1926, and was promoted to relieving roadmaster in July, 1937, and to roadmaster, with headquarters at Lanigan, on September 2, 1938.

William M. Peterson, whose promotion to supervisor of track on the Toledo division of the Michigan Central, with headquarters at Detroit, Mich., was announced in the January issue, was born at Stratford, Ont., on March 11, 1884, and entered railway service on July 3, 1908, as a laborer on the Michigan Central at Ceresco, Mich. On March 15, 1910, he was promoted to section foreman at Ceresco, and on September 19, 1919, he was advanced to extra gang foreman on the Middle division. On April 13, 1923, he was appointed rail inspector, and two months later he was promoted to assistant roadmaster. On May 15, 1926, he was promoted to roadmaster on the Saginaw division, later being transferred to Kalamazoo, Mich., and to Battle Creek. On May 1, 1935, he was appointed extra gang foreman and seven months later he was appointed general foreman. On July 1, 1938, he was promoted to assistant supervisor of track on the East division, the position he held at the time of his recent promotion.

Martin J. Bielema, whose promotion to roadmaster on the Chicago & North Western, with headquarters at Wall Lake, Iowa, was announced in the January issue, was born in Whiteside County, Ill., on January 28, 1899, and entered railway service on August 26, 1920, as a section laborer on the North Western. On July 1, 1923, he was promoted to section foreman on the Galena division, and subsequently served in this capacity and as extra gang and general foreman on steel and surfacing gangs on the Galena and Illinois divisions from April 1, 1928, to November 15, 1938, and as welding gang foreman and welding inspector on the Galena and Iowa divisions during 1936. From February 1, 1937, until August 1, 1937, he was appointed assistant roadmaster at Sterling, Ill. He was a section foreman on the Galena division at the time of his recent promotion.

William F. Smock, whose promotion to track supervisor on the Mobile division of the Southern, with headquarters at Selma, Ala., was announced in the January issue, was born at Harrodsburg, Ky., on June 8, 1902, and entered railway service on July 5, 1918, as an inspector and draftsman in the maintenance of way department of the Southern at St. Louis, Mo. On June 1, 1919, he left railway service, but returned to the Southern on March 15, 1920, as a draftsman and junior engineer at St. Louis. On May 1, 1922, he went with the Florida East Coast at St. Augustine, Fla., as a transitman on preliminary and location surveys and then engaged with several other companies. On May 17, 1938, Mr. Smock returned to the Southern as a rodman at Oakdale, Tenn., and on August 1, 1938, he was appointed assistant to roadmaster, with headquarters at Somerset, Ky. One month later he was promoted to assistant bridge and building supervisor, with headquarters at Birmingham, Ala., the position he held at the time of his recent promotion.

Edgar C. Jones, whose retirement as roadmaster on the Chicago & North Western, with headquarters at Milwaukee, Wis., was announced in the January issue, was born in England on May 28, 1870, and entered railway service in the spring of 1892, on the construction of the Grand Island & Northern Wyoming (now part of the Chicago, Burlington & Quincy) between Gillette, Wyo., and Sheridan. From 1893 until April 22, 1898, he worked on the construction and removal of tracks at the World's Columbian Exposition, Chicago, on the construction of various surface and elevated lines in that city, on the construction of the Chicago, North Shore & Milwaukee from Highland Park, Ill., to Ft. Sheridan, and on the construction of a portion of the Wisconsin & Michigan. On the latter date he entered the service of the North Western as an assistant foreman on double track work at Harvard, Ill., and the following year he was placed in charge of a steel gang. In 1904, he was appointed a foreman and later an assistant general foreman on track elevation work in Chicago. Mr. Jones was promoted to roadmaster with headquarters at Ishpeming, Mich., in November, 1911, and the following year he

was transferred to Milwaukee in charge of the terminals at that point and the line to Fond du Lac, Wis.

L. W. Green, assistant supervisor of track on the Pittsburgh division of the Pennsylvania, has been promoted to supervisor of track on the Williamsport division, with headquarters at Lock Haven, Pa., to succeed **C. F. Neu,** who has been transferred to the Philadelphia Terminal division. Mr. Neu succeeds **G. M. Hain,** whose promotion to division engineer of the Toledo division is announced elsewhere in these columns. **L. E. McCarl,** assistant on the engineering corps, has been promoted to assistant supervisor of track on the Maryland division, with headquarters at Baltimore, Md., succeeding **J. H. Kerchner,** who has been promoted to supervisor of track on the Erie & Ashtabula division. **H. W. Anderson,** chief draftsman on the Eastern Pennsylvania division, has been promoted to supervisor of track on the Middle division, with headquarters at Altoona, Pa. **M. S. Smith, Jr.,** has been appointed supervisor of track, with headquarters at New York, to succeed **J. B. Jones** whose appointment as division engineer on the St. Louis division at Terre Haute, Ind., is noted elsewhere in these columns.

Bridge and Building

T. E. Jackson has been appointed supervisor of bridges and buildings of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz., succeeding **A. L. Robinson,** whose death on December 4, was reported in the January issue.

William Ascott, whose promotion to master carpenter on the Chicago, Burlington & Quincy, with headquarters at Aurora, Ill., was announced in the January issue, was born at Keokuk, Iowa, in July, 1882, and entered railway service in January, 1910, as a carpenter in the bridge and building department of the Burlington. In 1917, he was promoted to bridge and building foreman in charge of concrete work on the Aurora track elevation and in 1925 he was advanced to assistant master carpenter, with headquarters at Aurora. Mr. Ascott was transferred to Beardstown in August, 1934.

George A. Wiegel, whose retirement as master carpenter on the Chicago, Burlington & Quincy, with headquarters at Chicago, was announced in the January issue, was born at Irwin, Pa., on February 3, 1877, and attended Bucknell Academy and Ohio Northern University. After a short period of service successively with the Illinois Central, the St. Louis-San Francisco, and with the Westinghouse Electric Company, he entered the service of the Burlington on October 13, 1905, as an assistant engineer at Chicago, and on January 1, 1917, he was appointed engineer in the land and industrial department. During the period of government control of the railroads, he held the position of office engineer for the regional director of the Central Western region of the United States Railroad Administration. On March 1, 1920, he was appointed special engineer for the Burlington at Chicago on the Chicago Union Station work, and continued to hold the title of special engineer upon the completion of that work in 1926. Mr. Wiegel was promoted to division engineer, with headquarters at Chicago, on December 1, 1931, and one year later, he was appointed master carpenter, with the same headquarters.

Daniel W. Isaacs, whose promotion to master carpenter on the Chicago, Rock Island & Pacific, with headquarters at El Reno, Okla., was announced in the January issue, was born at Dekalb, Mo., on September 9, 1893, and entered railway service in the spring of 1910, as a pumper on the Rock Island. In 1915 he became a bridge carpenter helper. During the World War he served in the engineer corps of the 89th division. He returned to the Rock Island as a bridge and building helper in August, 1919, and on April 10, 1920, he was promoted to pile driver engineer. In November, 1927, Mr. Isaacs was advanced to pile driver foreman and in November, 1936, he was appointed bridge and building foreman on the Missouri-Kansas division, the position he held at the time of his recent promotion.

Obituary

John Clendening, who retired as roadmaster on the Western division of the Southern Pacific, with headquarters at Niles, Cal., in October, 1922, died on October 30.

James Gratto, who retired as bridge and building supervisor on the Los Angeles division of the Southern Pacific, with headquarters at Los Angeles, Cal., in the spring of 1923, died on October 28.

Richard V. Nicholson, who retired in 1931 as bridge and building master of the Ottawa division of the Canadian Pacific after 47 years of service with that road, died in Toronto, Ont., on January 2.

Alexander M. Holcomb, who retired eight years ago as office engineer, on the Lines Buffalo and East, New York Central, with headquarters at New York, died on January 19 at his home in that city at the age of 78.

H. R. Leonard, who retired in May, 1938, as chief engineer of bridges and buildings of the Pennsylvania at Philadelphia, Pa., died at his home in Wayne, Pa., on January 11, after a short illness. He was in his 81st year.

Andrew Gibson, who retired as superintendent of tie and timber treatment of the Northern Pacific, with headquarters at Brainerd, Minn., on July 1, 1930, died in St. Paul on January 10. Mr. Gibson started work with the Northern Pacific as a rodman in the engineering corps in 1883, was a division superintendent at Glendive, Mont., and Missoula for five years and was engineer maintenance of way of the railway from 1911 to 1917.

Israel L. Bearce, at one time an assistant engineer and later an inspector on the Chicago & North Western, who retired in 1926, died in Chicago on December 19. Mr. Bearce served as a resident engineer on the Chicago, Milwaukee, St. Paul & Pacific and on the Atchison, Topeka & Santa Fe prior to 1904, and later served as an instrumentman on the South Side Elevated work in Chicago. In May, 1909, he went with the North Western as instrumentman on track elevation work, and a month later he was promoted to assistant engineer. He resigned in 1910, but re-entered the service of the North Western again in 1915 as an inspector.

Joseph P. Newell, a consulting engineer specializing in railway matters at Portland, Ore., and at one time division engineer of the Oregon division of the Oregon Railway & Navigation Company (part of the Union Pacific system), died at Portland on December 5. Mr. Newell was a graduate of Massachusetts Institute of Technology and entered railway service as a draftsman for the Cincinnati Southern (now part of the Southern Railway system) in 1888. A year later he entered the service of the Oregon Railway & Navigation Company and in 1897, he was promoted to division engineer of the Oregon division. In 1907, he began a consulting practice in Portland.

Colonel Frederick Mears, assistant chief engineer on the Great Northern, with headquarters at Seattle, Wash., died in that city on January 11, following an operation. Colonel Mears was born at Fort Omaha, Neb., on May 25, 1878, and graduated from Shattuck School, Faribault, Minn., in 1897. He entered railway service in June of that year with the Great Northern, being assigned to survey and construction work. He was later promoted to assistant engineer and in July, 1905, was appointed assistant engineer on the Chicago, Rock Island & Pacific. In October, 1905, he entered the service of the United States Army and in May, 1906, was appointed assistant engineer with the Isthmian Canal Commission at Panama. Colonel Mears was promoted to resident engineer of the Panama Railroad in May, 1907, and in December, 1909, was advanced to chief engineer. In 1913, he was appointed also general superintendent. In May, 1915, he was appointed a member of the Alaskan Engineering Commission, on which he served until February, 1918, when he was appointed assistant general manager of the railroad department of the United States Army in the United States and France. He was later promoted to general manager, which position he held until August, 1919, when he was appointed chairman and chief engineer of the Alaskan

Colonel Frederick Mears

Engineering Commission in charge of Alaska railroad operation and construction. Colonel Mears was appointed chief engineer of the St. Paul Union Depot Company in charge of the construction of the St. Paul Union Depot in August, 1923, and remained in that position until April, 1925, when he was appointed assistant chief engineer in charge of Western lines of the Great Northern.

Harry Van Gorder, who retired as roadmaster on the Chicago & North Western, with headquarters at Antigo, Wis., in 1931, died at that point on December 5, 1938. Mr. Van Gorder entered railroad service in 1879 in the track department of the Ohio & Mississippi (now part of the Baltimore & Ohio), and served as a roadmaster on the Cleveland, Cincinnati, Chicago & St. Louis, from 1896 until 1903, and on the Chicago Great Western for two years, after which he entered the service of the North Western as a general foreman. He returned to the Big Four in 1906 as a supervisor of track, and in 1909, he returned to the North Western on new line construction work. In 1911, he was appointed roadmaster, with headquarters at Antigo, Wis., and held that position until his retirement in 1931.

Hugh Wilson, an engineer by training and experience, who retired as superintendent of the Salt Lake division of the Denver & Rio Grande Western, with headquarters at Salt Lake City, Utah, on November 1, 1938, died at San Diego, Cal., on December 26. Mr. Wilson was born at Lincoln, Neb., on September 21, 1876, and graduated in civil engineering from the University of Nebraska in 1897. He first entered railway service in 1894 between terms of school as a track laborer on the Chicago, Burlington & Quincy, and until his graduation in 1897 served intermittently as section laborer, section foreman, foreman and brakeman. In 1897, he was appointed a section foreman, and a year later he volunteered for service in the Spanish-American war. In 1899, he returned to the Burlington, as an instrumentman on location and later that year was promoted to roadmaster. In 1902, he was advanced to trainmaster and in 1905 he went with the Missouri Pacific as assistant engineer. In 1906 he was promoted to superintendent, and in the following year he went with the D. & R. G. W. as an assistant superintendent. In 1910, he became a trainmaster on the Northwestern Pacific and in 1911 he was promoted to assistant superintendent. From 1913 to 1914 he served as an expert on the Railway Commission of the State of California, and in 1914 he returned to the Northwestern Pacific as assistant to the president. Later in 1914 he went with the Baltimore & Ohio as special engineer on the vice-president's staff, and in 1916 he was appointed assistant superintendent. He was promoted to superintendent in 1918, and in 1919 he was appointed special assistant to the federal manager of the Chicago Great Western. In 1920 he was advanced to engineer of maintenance of way of the Chicago Great Western and in 1921 he returned to the D. & R. G. W. as a trainmaster. Mr. Wilson was promoted to superintendent with headquarters at Grand Junction, Colo., in 1924 and was later transferred to Salt Lake City.

Association News

Maintenance of Way Club of Chicago

The January meeting of the club, held at the Auditorium Hotel on January 23, was addressed by A. L. Bartlett, engineer maintenance of way of the New York, New Haven & Hartford, and H. F. Fifield, engineer maintenance of way of the Boston & Maine, who, assisted by lantern slides, described the extensive damage that occurred on their respective roads at the time of the recent New England floods and hurricane, and the work of rehabilitation. One hundred and twelve members and guests were in attendance, the largest at any meeting thus far in the present season.

Metropolitan Track Supervisors Club

The next meeting of the Metropolitan Track Supervisors Club will be held in the Colonial Room of the Hotel McAlpin, New York City, on February 9. Dinner will be served at 6:30 p.m. The meeting, which will begin at 8:00 p.m., will be addressed by four speakers who will talk on Special Track Work. They will include A. F. Huber, chief engineer, Ramapo Ajax Company, who will talk on design; H. S. Heyl, superintendent, Taylor-Wharton Iron & Steel Company, on manufacturing methods; B. Blowers, division engineer, Erie, on installation; and J. M. Fox, division engineer, Pennsylvania, on maintenance.

The Wood-Preservers' Association

Three hundred and twenty-eight men interested in the treatment of timber attended the thirty-fifth annual convention at Washington, D. C., on January 24-26, approximately one hundred of whom came from Chicago and St. Louis on a special train operated by the Big Four, the N. & W., and the R. F. & P., and stopped en route to visit the treating plants of the N. & W. at Radford, Va., and of L. A. Clarke & Son, Inc., at Massaponax.

In addition to reports and addresses dealing with the refinement of processes for the treating of timber and with the results secured from treated timber, the convention was addressed by W. H. Bettis, maintenance engineer, Norfolk & Western, on The Experience of the Norfolk & Western with Treated Timber and by P. Petri, chief engineer maintenance, Baltimore & Ohio System, on What the Baltimore and Ohio Has Learned from the Treatment of Timber Other Than Cross and Switch Ties.

At the concluding session on Thursday morning, the following officers were elected: President, C. S. Burt, supt., ties and treatment, I. C., Grenada, Miss.; first vice-president, Ralph E. Meyers, sales mgr., International Creosoting & Construction Co., Galveston, Texas; second vice-president, W. R. Goodwin, engr., wood preservation, M. St. P. & S. S. M.; treasurer, H. L. Dawson, Washington, D. C.; Directors, W. J. Burton, asst. to chief engineer, M. P., and W. P. Conyers, Jr., v. p. and treas., Taylor-Colquitt Co., Spartansburg, S. C.

At a meeting of the executive committee following the adjournment of the convention on Thursday afternoon, M. F. Jaeger, supt., Port Reading Creosoting Plant, C. R. R. of N. J.—Reading railways—was reappointed to the executive committee to fill the vacancy created by the election of Mr. Goodwin as vice-president. At this meeting also, J. S. Giddings, chemist, A. T. & S. F., was appointed chairman of the Preservatives committee to succeed R. E. Waterman who declined reappointment.

American Railway Engineering Association

All preliminary arrangements have been completed for the convention to be held at the Palmer House, in Chicago, on March 14, 15 and 16. With the mailing of Bulletin No. 408 late in January, members of the association now have preprint of all of the committee reports to be presented at the convention, with the exception of seven, which will be sent out in Bulletin No. 409 about the middle of February. This last bulletin will contain reports of the Committees on Roadway and Ballast, Ties, Rail, Track, Wood Preservation, Complete Roadway and Track Structure, and Stresses in Track.

With the committee work for the current year practically completed, only one committee held a meeting in January, this being the Committee on Yards and Terminals, which met at Pittsburgh, Pa., on the 16th, and only one committee has scheduled a meeting definitely for February, this being the Committee on Iron and Steel Structures, which will meet in Chicago on February 9 and 10 to formulate plans for its 1939 work.

National Railway Appliances Association

The twenty-eighth annual exhibit of the National Railway Appliances Association will be held at the International Amphitheatre, Chicago, on March 13-16, coincident with the conventions of the Signal section, A. A. R., and the American Railway Engineering Association. Prior to Friday, January 27, when the officers and directors of the N. R. A. A. met in Chicago to make space assignments, the 60 companies listed below had already arranged to present exhibits. This large number of exhibitors at this date, based on past experience, indicates that the exhibit this year will be as large or larger than in recent years.

In view of this fact, and the expected participation of a number of manufacturers of signal equipment and materials in connection with the convention of the Signal section, combined with the highly favorable comments of railway officers last year regarding spacious and attractive accommodations afforded by the International Amphitheatre, it is expected that the exhibit will be largely attended, not alone by those railway officers who will take an active part in the convention activities, but also by a large number of other railway men located in Chicago and adjacent territory. In addition, a number of the committees of the

Purchases and Stores division, A. A. R., have arranged meetings in Chicago during the convention week to give their members an opportunity to visit the exhibit.

To make it possible for those attending the A.R.E.A. convention to visit the exhibit as frequently as possible with maximum convenience, complimentary bus service, will be operated between the Palmer House and the Amphitheatre on frequent schedules. Similar bus service will be made available between the Amphitheatre and the Stevens Hotel during the meeting of the Signal section.

As in past years, and emphasized again last year, the N. R. A. A., in cooperation with the railway associations, is making a special effort to confine all exhibits to the amphitheatre, to the exclusion of exhibits and entertainment at the convention hotels.

The companies which have arranged to present exhibits to date are as follows:

Air Reduction Sales Co., New York
American Car & Foundry Co., New York
American Fork & Hoe Co., Cleveland, Ohio
Armco Culvert Manufacturers Ass'n., Middletown, Ohio
Barco Manufacturing Co., Chicago
Buda Company, Harvey, Ill.
Cleveland Frog & Crossing Co., Cleveland, Ohio
Cleveland Tractor Co., Cleveland, Ohio
Cullen-Friestedt Co., Chicago
Dearborn Chemical Co., Chicago
Dickinson, Inc., Paul, Chicago
Duff-Norton Manufacturing Co., Pittsburgh, Pa.
Eaton Manufacturing Co. (Spring Washer Div.), Massillon, Ohio
Elastic Rail Spike Corp., New York
Electric Tamper & Equipment Co., Ludington, Mich.
Fairbanks, Morse & Co., Chicago
Fairmont Railway Motors, Inc., Fairmont, Minn.
Hogan, George M., Chicago
Homelite Corporation, Port Chester, N. Y.
Hubbard & Co., Pittsburgh, Pa.
Industrial Brownhoist Corporation, Bay City, Mich.
International Harvester Co., Chicago
Johns-Manville, New York
Jordan Co., O. F., East Chicago, Ind.
Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Lehon Co., Chicago
Lewis Bolt & Nut Co., Minneapolis, Minn.
Maintenance Equipment Co., Chicago
Mall Tool Co., Chicago
Master Builders Co., Cleveland, Ohio
Metal & Thermit Corp., New York
Morden Frog & Crossing Works, Chicago
Morrison Railway Supply Corp., Buffalo, N. Y.
National Aluminate Co., Chicago
National Lead Co., New York
National Lock Washer Co., Newark, N. J.
Nordberg Manufacturing Co., Milwaukee, Wis.
Oxweld Railroad Service Co., Chicago
P. & M. Co., Chicago
Pettibone Mulliken Co., Chicago
Philadelphia Steel & Wire Corp., Philadelphia, Pa.
Pocket List of Railroad Officials, New York
Rail Joint Co., New York
Railroad Accessories Corp., New York
Rails Co., New Haven, Conn.
Railway Engineering and Maintenance, Chicago
Railway Purchases and Stores, Chicago
Railway Track-Work Co., Philadelphia, Pa.
Ramapo Ajax Div. American Brake Shoe & Foundry Co., New York
Republic Steel Corp., Cleveland, Ohio
Sika, Inc., New York
Sperry Products, Inc., Hoboken, N. J.
Teleweld, Inc., Chicago
Templeton, Kenly & Co., Chicago
Timber Engineering Co., Washington, D. C.
United States Steel Corp., Pittsburgh, Pa.
U. S. Wind Engine & Pump Co., Batavia, Ill.
Western Railroad Supply Co., Chicago
Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Woolery Machine Co., Minneapolis, Minn.

Roadmasters Association

F. B. LaFleur (S. P.), president, has announced the following personnel of committees to study and present reports at the convention next September:

Specialized Versus Section Gangs—J. M. Murphy (chairman), rdm., C. M. St. P. & P., Sioux Falls, S. D.; W. H. Haggerty (vice-chairman), supvr., N. Y. N. H. & H., New Rochelle, N. Y.; C. E. Brown, rdm., P. & S. F., Slaton, Tex.; M. H. Dick, eastern editor, *Railway Engineering and Maintenance*, New York; J. H. Dunn, rdm., N. Y. C. & St. L., Ft. Wayne, Ind.; G. L. Griggs, rdm., C. B. & Q., Hannibal, Mo.; V. I. Kessinger, rdm., A. T. & S. F., Independence, Kan.; O. R. McIlhenny, ch. engr. and asst. supt., T. C. I. & R. R., Ensley, Ala.; F. J. Meyer, gen'l. rdm., N. Y. O. & W., Middletown, N. Y.; W. H. Oglesby, supvr., Sou., Camden, S. C.; G. M. O'Rourke, dist, engr., I. C., Chicago; C. L. Stuckey, rdm., M. P., Harlingen, Tex.; A. W. Wehner, rdm., S. P., Lake Charles, La.

The Maintenance of Curves—C. W. Baldridge (chairman), asst. engr., A. T. & S. F., Chicago; P. J. Weiland (vice-chairman), rdm., C. M. St. P. & P., Ottumwa, Iowa; A. W. Applequist, rdm., Soo Line, Bismarck, N. D.; E. L. Banion, rdm., A. T. & S. F., Marceline, Mo.; M. R. Black, supvr., L. & N., Etowah, Tenn.; R. W. Bonney, rdm., S. A. L., Lake City, Fla.; W. E. Chapman, supvr., C. of G., Union Springs, Ala.; R. L. Fox, rdm., Sou., Alexandria, Va.; J. G. Gilley, supr., C. & O., Pikeville, Ky.; C. J. Jaeschke, div. engr., M. P., Little Rock, Ark.; J. H. Morgan, engr. m. w., F. E. C., St. Augustine, Fla.; S. Payson, rdm., St. L.-S. F., Enid, Okla.; J. C. Runyon, supvr., C. & O., Covington, Ky.; C. W. Russell, rdm., Sou., Greenville, S. C.; C. R. Schoenfield, rdm., C. B. & Q., Aurora, Ill.; T. N. Turner, rdm., M. P., Newport, Ark.; V. R. Walling, engr. m. w., C. & W. I., Chicago.

Heaving Track; Its Causes, Control and Maintenance—L. J. Gilmore (chairman), div. rdm., G. N., Superior, Wis.; L. P. Chicoine (vice-chairman), rdm., C. P., Vaudreuil, Que.; E. G. Brisbin, supvr., M. C., Jackson, Mich.; H. H. Britton, supvr., N. Y. C., Adrian, Mich.; W. J. Daehn, rdm., C. & N. W., Sparta, Wis.; J. Ferguson, div. engr., C. N., London, Ont.; J. E. Johnston, rdm., S. P., Douglas, Ariz.; F. J. Liston, rdm., C. P., Montreal, Que.; H. P. Mason, supvr., B. & M., Boston, Mass.; P. F. Muller, rdm., C. & W. I., Chicago; S. J. Owens, rdm., C. B. & Q., So. Sioux City, Neb.; I. D. Talmadge, rdm., N. Y. O. & W., Middletown, N. Y.

Anchoring Track (To Meet Present Day Conditions) — J. J. Clutz (chairman), supvr., Penna., Trenton, N. J.; R. L. Longshore (vice-chairman), gen'l. main. insp., Wabash, St. Louis, Mo.; R. F. D. Bowman, rdm., C. P. Lethbridge, Alta.; A. B. Chaney, dist. engr., M. P., Little Rock, Ark.; H. E. Durham, rdm., K. C. S., Pittsburg, Kan.; F. L. Etchison, rdm., A. C. L., Charleston, S. C.; S. J. Hale, asst. supt., N. & W., Bluefield, W. Va.; L. W. Jones, rdm., C. B. & Q., Curtis, Neb.; O. I. Miller, rdm., C. M. St. P. & P., Marion, Iowa; C. T. Mulcahy, rdm., S. P., Bakersfield, Cal.; W. A. Murray, engr. m. w., N. Y. C., New York; Wm. O'Brien, rdm., P. M., Toledo, Ohio; F. G. Walter, asst. engr., I. C., Chicago; J. F. Barron, asst. rdm., Sou., Hattiesburg, Miss.

The Roadmaster's Qualifications and Duties—B. E. Haley (chairman), gen'l. rdm., A. C. L., Lakeland, Fla.; J. M. Miller (vice-chairman), div. engr., W. M., Cumberland, Md.; W. O. Frame, asst. supt., C. B. & Q., Wymore, Neb.; W. S. Hofford, ch. clk., U. P., Los Angeles, Cal.; G. S. King, supvr., Sou., Blackville, S. C.; J. H. Lynch, rdm., C. R. I. & P., Chickasha, Okla.; F. H. Masters, ch. engr., E. J. & E., Joliet, Ill.; G. B. McClellen, rdm., T. & P., Marshall, Tex.; G. L. sitton, ch. engr. m. w. & s., Sou., Charlotte, N. C.; W. H. Sparks, insp. track, C. & O., Russell, Ky.; G. E. Sterling, rdm., C. & N. W., Eagle Grove, Iowa; G. E. Stewart, rdm., S. P., Merced, Cal.; R. H. Smith, gen'l. mgr., N. & W., Roanake, Va.; G. G. Smart, gen'l. rdm., G. N., Seattle, Wash.; H. W. Steger, supvr., Jacksonville Terminal, Jacksonville, Fla.

The Utilization of Roadway Machines—H. E. Kirby (chairman), asst. engr., C. & O., Richmond, Va.; R. S. Kniffen (vice-chairman), gen'l. rdm., G. N., Duluth, Minn.; G. W. Benson, supvr., C. of Ga., Griffin, Ga.; M. D. Carothers, div. engr., Alton, Bloomington, Ill.; R. H. Gilkey, div. engr., C. of G., Savannah, Ga.; R. E. Meyer, rdm., C. & N. W., Mason City, Iowa; M. R. Palmer, rdm., A. T. & S. F., Las Vegas, N. M.; E. L. Potarf, dist. engr. maint., C. B. & Q., Omaha, Neb.; W. G. Radford, supvr., Sou., Greenville, S. C.; J. T. Stotler, rdm., N. P., Lester, Wash.

Supply Trade News

Personal

Harry M. Francis, assistant general manager of sales in the Cleveland, Ohio, office of the **American Steel & Wire Co.,** subsidiary of the United States Steel Corporation, has been appointed assistant vice-president—sales.

Donald A. Robison, treasurer of the **Caterpillar Tractor Company,** Peoria, Ill., has been promoted to general sales manager. Mr. Robison entered the employ of the Caterpillar Tractor Company in 1926, at San Leandro, Cal. Subsequently he was employed in the parts, credit and sales departments. In 1930, he was promoted to assistant treasurer, and in 1937 to treasurer.

Obituary

William R. Seigle, chairman of the board since 1929 and research director of the Johns-Manville Corporation, died at St. Mary's Hospital in Rochester, Minn., on December 27, after an operation at the Mayo Clinic.

Albert E. Brown, general manager of railroad sales of the Truscon Steel Company, with headquarters at New York, died in Chicago on January 5 of a lingering illness. He was born on December 19, 1884, at Cincinnati, Ohio, and entered railway service in the general office of the Atchison, Topeka & Santa Fe, and later was employed by the Minneapolis, St. Paul & Sault Ste. Marie at Cincinnati, and by the Denver & Rio Grande Western as general freight agent at Detroit, Mich. When the railroads were taken over by the government during the war, he entered the employ of the Chicago & Alton as general agent. In 1919, he was appointed general manager of railroad sales for the Truscon Steel Company, with headquarters at Chicago. Later he made his headquarters at Youngstown, Ohio, and more recently at New York.

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Sealed Bids will be received at the Va. Dept. of Hwys., Room 321, State Office Building, Richmond, Va., until 10 A.M., Feb. 16, 1939, for eleven Norfolk Southern RR Grade Crossing Signal Installations, located in Norfolk & Pr. Anne Cos., Va., and will be considered as one project.

ALPHABETICAL INDEX TO ADVERTISERS

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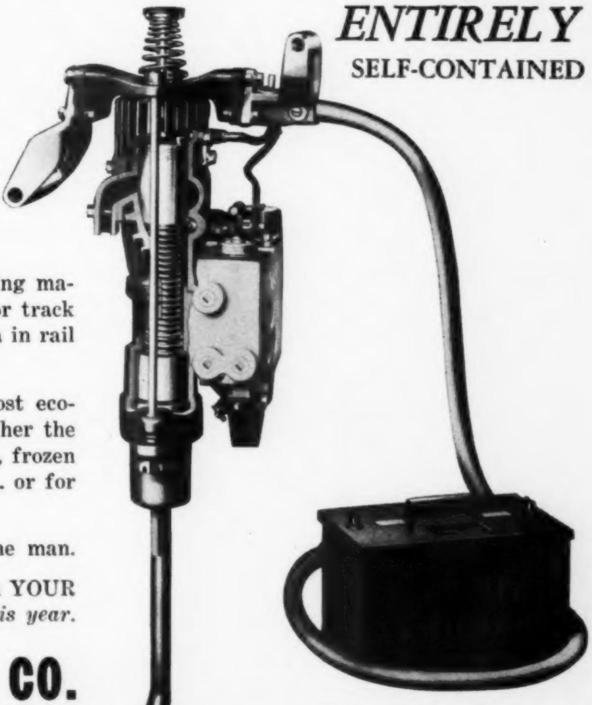

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